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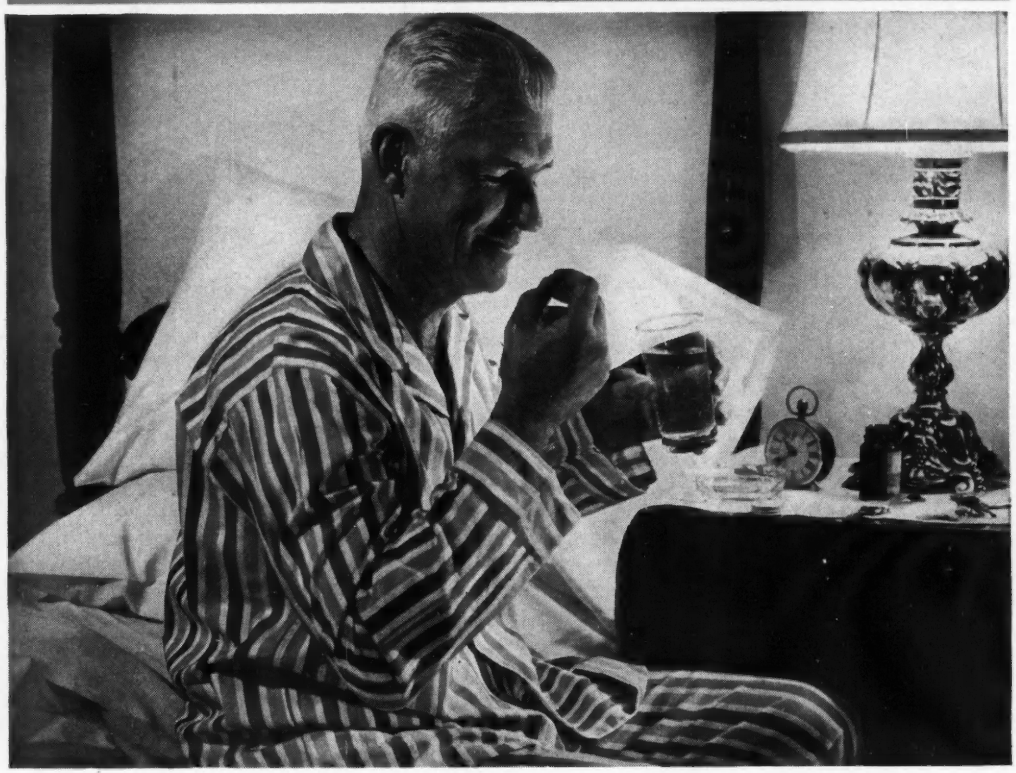

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The Kolff-Merrill Artificial Kidney

Clinical Application in Acute Renal Insufficiency

CHRISTOPHER C. SHAW, CAPTAIN (MC) USN, Philadelphia, Pa.

• Acute renal insufficiency is often called "lower nephron nephrosis." Its recognition, its prognostic significance, and its therapy by conservative measures are receiving increasing clinical emphasis. The mortality rate in this complicated syndrome still remains unduly high.

One method of therapy of anuric patients whose lives are in jeopardy because of fulminating uremia or critical potassium intoxication is use of an artificial kidney to "purify" the blood stream by means of extracorporeal dialysis.

The author describes clinical (and laboratory) experience with ten such dialyzed patients, eight of whom presented the classical picture of acute renal insufficiency. Four died, one from unrecognized coronary occlusion, another from antecedent, overwhelming peritonitis. Two other patients with chronic kidney disorders received no benefit from dialysis and died of renal disease.

Good biochemical and clinical response was brought about in six cases of lower nephron nephrosis. Presumably, these six patients would have died had they not been subjected to artificial dialysis.

THE PURPOSE OF THIS COMMUNICATION is to report the author's experience with ten patients who had hemodialysis by an artificial kidney at the United States Naval Hospital in Oakland, California, between July 1953 and June 1954. Six of the patients were in extremis from acute renal insufficiency.

Acute renal insufficiency is a broad descriptive term embracing the bizarre biochemical, clinical and physiologic manifestations induced by sudden decompensation of the kidneys. Bywaters[4, 5] described fatal renal dysfunction complicating extensive crushing injuries received by persons during the bombing of London (1940-41). The syndrome was clearly delineated as "lower nephron nephrosis" by Lucké[10] in 1946. Clinical and laboratory studies of the physiologic changes and extreme biochemical derangements resulting from post-traumatic renal failure were contributed by Beecher[2] and Burnett[3] and their co-workers. During the past decade post-traumatic acute renal insufficiency[6, 7, 8] has been the subject of intensive clinical emphasis and investigation.[15-21] Application of the principle of extracorporeal hemodialysis by means of an artificial kidney[1] is gaining increasing acceptance through the clinical contributions of Merrill and co-workers at the Peter Bent Brigham Hospital in Boston.[11,12,13,14]

The first experimental artificial kidney was devised in the laboratory of Abel, Rowntree and Tur-

From the Metabolic Research Facility, U. S. Naval Hospital, Oakland (where the author was formerly Chief of Medicine).

Submitted: November 3, 1954.

The opinions or assertions herein are the private ones of the writer and are not to be construed as official or reflecting the views of the United States Navy or of the Naval Service at large.

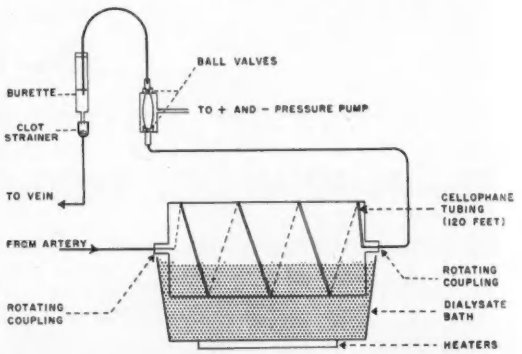
TABLE 1.—*Dialysate bath*

Chemical	Wt. in Grams Per 100 Liters	mEq. Per Liter					
		Sodium	Potassium	Magnesium	Calcium	Chloride	Bicarbonate
Sodium chloride	660	113	..	..	..	113	..
Sodium bicarbonate	225	27	..	..	..	..	27
Potassium chloride	30	..	4	..	..	4	..
Magnesium chloride	22	..	..	2	..	2	..
Calcium chloride	40	..	..	..	5	5	..
Glucose	200	..	..	..	..	..	..
Totals		140	4	2	5	124	27
Normal plasma		142	5	3	5	103	27

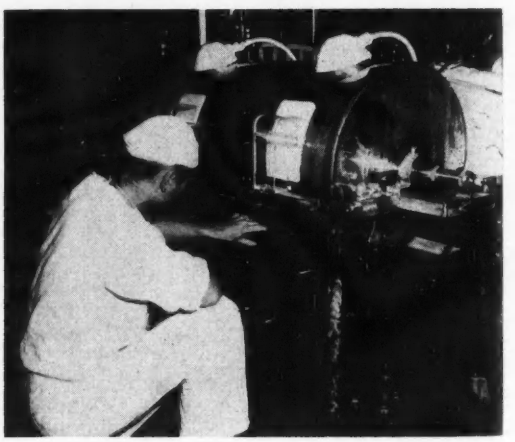
ner in 1913[1] but, because of technical obstacles, remained in the research field until 1944 when Kolff, a Dutch physician in Kampen, Holland, built an artificial kidney machine during the German occupation and successfully applied it clinically.[9] He used cellophane tubing as a conduit to carry the patient's blood through an extracorporeal circuit in contact with an electrolyte bath of known composition, equivalent to the concentration of essential electrolytes and glucose in normal plasma (see Table 1).

When cellophane tubing is grossly swollen with water, it possesses capillary channels of submicroscopic size through which molecules of diffusible substances pass from the blood into the bath fluid, or conversely. These submicroscopic fenestra in wet cellophane membrane are permeable to crystalloids (inorganic electrolytes) and to organic substances of small molecular size (urea, creatinine, uric acid, glucose). However, plasma-bound proteins, hemoglobin, red and white corpuscles and platelets are nondiffusible because of their larger structure. The principle on which hemodialysis is based depends on the relative concentration of diffusible molecules in the bath and in the blood stream.

In the last ten years a number of improvements and modifications of this principle have been adopted —notably by Merrill of Boston—and today there are some 50 such machines in the United States. The Kolff-Merrill apparatus provides a large dialyzing area of approximately 24,000 square centimeters, whereas the dialyzing area of the normal kidneys in an adult is approximately 7,600 square centimeters. The larger the surface area, the more efficient the dialysis, other things being equal.



Circuit diagram of Artificial Kidney (after Teschan and McDowell[21]).



Kolff-Merrill Artificial Kidney; preparation of dialysate bath.

TECHNIQUE[23]

Eight hundred milliliters of compatible donor blood is required to prime the coils of cellophane wound spirally around a metal drum. Blood from the radial artery of the patient is conducted by sterile tubing through a continuous extracorporeal circuit of approximately 140 feet, some 120 to 130 feet of which is cellophane in contact with the dialyzing bath. After "purification," the blood is returned to the patient's vein, usually in the antecubital area of the arm from which it is withdrawn. The rotary motion of the metal drum around which the cellophane tubing is wound propels the blood through the machine, and a pump pulls the dialyzed blood into a sterile reservoir whence it flows by gravity to the venous circulation. Heparin is administered to the patient at regular intervals during dialysis to prevent hemocoagulation. The entire cir-

cuit must be airtight so that no bubbles enter the system; rate of flow of blood from the artery must equilibrate with the rate of venous return, or vice versa; and there must be no leaks. During a six-hour procedure the total blood volume circulates through the extracorporeal system approximately every 30 minutes. Hence, there are usually 12 complete exchanges or dialyses of the patient's blood with the artificial kidney bath during a typical "run."

CLINICAL EXPERIENCE

In a one-year period 1953-54 ten patients (Table 2) had hemodialysis with the Kolff-Merrill artificial kidney at the U. S. Naval Hospital, Oakland. Of eight patients with acute renal insufficiency, six recovered, two died. The two other patients had chronic terminal renal disease and hemodialysis was carried out in the hope that they might be temporarily improved. In both cases the results were disappointing and did not justify the means employed. Each of the six patients who recovered had acute renal insufficiency that had developed after severe traumatic episodes (see data in Table 2). In each instance the patient was very carefully observed and treated conservatively for a period of seven to 13 days before dialysis was recommended because of extreme azotemia, severe potassium intoxication, or both.

CASE REPORTS

Details of the condition of the patients and the results of hemodialysis are given in the following case reports:

CASE 1. A 40-year-old man was very severely injured in an automobile accident on June 28, 1953. Upon emergency operation at the Travis Air Force Base Hospital a huge rent in the liver from the dome down to the free margin of the right lobe was sutured and adequate measures to combat shock were carried out. The condition of the patient remained stable but anuria suddenly developed. Conservative fluid therapy was immediately instituted and the patient was transferred to the U. S. Naval Hospital, Oakland, on July 2, 1953 (the fourth day of oliguria) because serum potassium had risen to 7.4 mEq. per liter. On that date the patient had three grand mal convulsive seizures. The spinal fluid contained 3,000 erythrocytes and 8 leukocytes per cubic millimeter. Bile was draining profusely from the wound in the right side of the abdomen. A neurological consultant was of the opinion that the patient had a subdural hematoma and that craniotomy was indicated. A large clot was removed from the left temporal area and the underlying brain was observed to be badly contused. The following day tracheotomy was necessary for removal of thick mucopurulent material by aspiration.

Between the eighth and ninth day of oliguria the early phase of diuresis began but coincidental with it there was pronounced progression of uremia. Because of the rapid deterioration of the clinical and biochemical condition of the patient, dialysis appeared justified, since uremia during early diuresis often is fatal.

Dialysis was carried on for five hours during the night of July 8, with definite biochemical and clinical improvement. On the day following dialysis there was a diminution in flow of urine to 300 ml. From then on the urine volume per 24 hours progressively increased from 2,255 ml. to 4,200 ml., yet uremia did not diminish. On the seventeenth day after injury, when the patient had reached the late diuretic phase, progressive clearing of retained metabolites began. Appropriate measures were taken during the entire course of acute renal insufficiency to insure normal hydration and electrolyte balance. There were no episodes of hypocalcemia or hypokalemia. Dehiscence of the abdominal wound developed, probably because of hypoproteinemia, but was effectively repaired surgically.

The patient made a brilliant recovery from all the multiple injuries and operations in spite of a loss of 38 pounds, or 25 per cent of the normal body weight (an index of the intensity of the catabolic reaction following severe trauma).

Comment: Dialysis by the artificial kidney carried the patient over a very critical period of acute renal insufficiency and did much to bring about eventual metabolic equilibrium.

CASE 2. A 26-year-old man was admitted to the hospital on August 27, 1953, ten days after severe injury in a collision of trucks in which a load of redwood logs pinned the patient in the cab of a truck, thrusting the steering wheel into his abdomen and compressing his legs against the seat. He remained in a jack-knifed position for some two and a half hours before he could be extricated. He was conscious throughout but when released was in shock. Emergency treatment was given in another hospital where it was noted that the signs and symptoms of acute renal insufficiency with fulminating potassium intoxication were present. Glucose and insulin were given intravenously and hydrogen cycle, carboxylic acid resins were administered by rectum. In spite of these measures the serum potassium continued to rise and the electrocardiographic pattern deteriorated.

Shortly after admission to the U. S. Naval Hospital, Oakland, on the tenth day of acute renal insufficiency, hemodialysis with the artificial kidney was carried out. This procedure was continued uneventfully for a six-hour period at flow rates between 225 ml. and 250 ml. of blood per minute. There was pronounced temporary improvement in the patient's condition both biochemically and electrocardiographically. However, he died of acute myocardial infarction five days later. (The diagnosis was confirmed at autopsy and the kidneys appeared normal on gross inspection.)

TABLE 2.—*Runs on artificial kidney at the U. S. Naval Hospital, Oakland, California (July 1953 to May 1954)*

No.	Date	Age	Status	Diagnosis	Indication	No. of Courses of Dialysis	Remarks	Outcome
1	7- 8-53	40	Major USAF	Acute renal insufficiency; post-traumatic	Uremia	1	3 fractured ribs, ruptured liver, contused lung, no K-intoxication; subdural hematoma.	Recovered
2	8-27-53	26	Civilian	Acute renal insufficiency; crush syndrome	K-intoxication	2	Suddenly expired 9-1-53; complete occlusion, right coronary A.	Died
3	9- 3-53	35	Airman, 3rd class, USAF	Acute renal insufficiency; post-traumatic	Uremia	3	21 fractures, flail chest, anterior mediastinitis, sternal osteomyelitis, oliguria 21 days hypernatremic encephalopathy.	Recovered
	9- 7-53				K-intoxication	4		
	9-11-53				K-intoxication	5		
4	9-21-53	34	Civilian	Acute renal insufficiency; incompatible transfusions	Uremia; hypotonicity	6	Extensive hemolyses caused by incompatible blood.	Recovered
5	10-20-53	40	Civilian	Chronic pyelonephritis	Uremia	7	Cerebral hemorrhage morning after dialysis.	Died
6	12-12-53	29	Civilian	Acute renal insufficiency; shock	Uremia	8	Ruptured uterus, defibrination, pelvic cellulitis; duodenal ulcer.	Recovered
7	1-16-54	66	Retired USN	Acute renal insufficiency; dehydration	Uremia	9	Acute renal insufficiency following colostomy for cancer of rectosigmoid, and peritonitis; recovered from acute renal insufficiency.	Died of antecedent infection
8	1-29-54	20	USN	Subacute glomerulonephritis	Uremia; K-intoxication	10	Developed oliguria and remained so until death. 2-10-54.	Died
9	4- 2-54	33	Civilian, dependent	Acute renal insufficiency; shock	Uremia; K-intoxication	11	Postcesarean section.	Recovered
10	5- 3-54	24	Civilian, dependent	Acute renal insufficiency; hemolysis; wrong blood, septicemia, hyperpyrexia	Uremia	12	Primary trouble—pelvic inflammatory disease (abortion).	Recovered

Comment: In this patient the immediate results of extracorporeal dialysis were encouraging. Death from coronary occlusion occurred on the fifth day after dialysis. There is no known correlation between acute renal insufficiency and death from myocardial infarction.

CASE 3. A 35-year-old man was admitted to the U. S. Naval Hospital, Oakland, on September 3, 1953, from the Parks Air Force Base Hospital with acute renal insufficiency as a result of extreme injuries received in an automobile accident on August 24, 1953. The patient had a "flail" thorax due to complete fractures of ribs 1 through 6 posteriorly on the right side and 2 through 5 on the left. In addition there was comminuted fracture of the right femur, tibia and fibula, simple fracture of the left clavicle, compound, comminuted fracture of both maxillae, concussion of the brain, multiple contusions of the soft tissues and lower nephron nephrosis.

On the eleventh day of extreme oliguria the biochemical findings indicated severe uremia and there was pronounced clinical deterioration. Despite the gravity of the patient's condition, it was decided to transfer him to the Naval Hospital for hemodialysis.

Although the immediate response to dialysis with the artificial kidney was considered satisfactory, the urine volume remained inadequate and uremia progressed. Four days later, serial electrocardiograms indicated progressive potassium intoxication and hemodialysis was carried out again. Again there was an adequate response both clinically and biochemically. However, the benefit was transient, and in the next two or three days the patient became more uremic, hyperkalemia developed and there were cardiac manifestations of potassium intoxication. Hydrogen cycle resins were administered by stomach tube and later by proctoclysis. This provoked refractory diarrhea and resulted in a striking decrease in biochemical reserves. The condition of the patient rapidly became critical and the outlook appeared all but hopeless.

Extensive osteomyelitis of the sternum developed from the compound fractures at the time of the original accident and the infection was extremely difficult to treat. The body temperature became "septic" in character and dehydration rapidly developed. There was pronounced wasting of the tissues indicative of an intense catabolic reaction. Near-lethal potassium intoxication on September 11, 1953, demanded dialysis for the third time. Oliguria continued until the twenty-first day, when gradually the early diuretic phase began and eventually the patient made a satisfactory recovery. The early part of the period of convalescence was characterized by hypernatremia (which will be reported elsewhere).

Comment: Extracorporeal dialysis on the artificial kidney was employed three times on this particular patient: first, because of uremia, and in the second and third instances because of fulminating potassium intoxication. It is felt that these three procedures sustained life in the patient through a very critical period of acute renal insufficiency.

CASE 4. The patient, a 34-year-old woman, was admitted to the U. S. Naval Hospital, Oakland, by transfer from a civilian hospital, September 20, 1953, with a diagnosis of lower nephron nephrosis due to transfusion of incompatible blood.

Twelve days earlier the patient had been operated upon elsewhere because of chronic backache. A spinal fusion bone graft was performed and the patient withstood the procedure fairly well. Because mild hypotension developed, two bottles of Dextran were given intravenously. The effect of this plasma expander was dissipated within five hours or so, and hypotension recurred. The patient then received 500 ml. of whole blood. The following day two additional bottles of whole blood were given and during the transfusion a chill developed, unaccompanied by fever or urticaria. Subsequently, the patient became jaundiced and oliguric. It was then established that the blood of the patient was Rh-negative and that she had received Rh-positive blood. The anti-Rh titer was 1:156, which confirmed incompatibility.

The patient was seen in consultation by the author on the ninth postoperative day. The signs and symptoms of full-blown acute renal insufficiency were present—azotemia, protracted vomiting and hyponatremia. Conservative treatment was recommended but on the twelfth postoperative day hemodialysis was performed because of severe clinical uremia, continued emesis and progressive hyponatremia. No increase in hemolysis was noted during the time dialysis was being carried out and the patient tolerated the procedure well. Fortunately, diuresis began spontaneously on September 22, 1953, the first day after dialysis, and proceeded uneventfully.

Intermittent vomiting amounting to as much as 1,100 ml. of vomitus per day was the only complication during the postdialysis period. Normal electrolyte values were maintained with difficulty, but 14 days after dialysis the patient's general condition had improved sufficiently to warrant transfer from the Naval Hospital to another hospital for convalescence. The patient was seen at intervals of one, three, six and nine months following the episode of acute renal insufficiency and appeared clinically to be well.

Comment: The artificial kidney carried the patient over a uremic "hump" and promptly reversed the clinical and biochemical deterioration. Upon removal of the toxic metabolic "load," the kidneys gradually elaborated sufficient urine to clear the blood stream, and spontaneous recovery ensued.

CASE 5. The patient, a man 40 years of age, had a history of chronic, recurrent pyelonephritis of ten years' duration. Multiple urologic measures, both medical and surgical, had not abated infection in both renal pelves.

In August 1953, exacerbation of the disease induced uremia. On October 1, 1953, the patient was admitted to the University of California Hospital in a convulsive state. He was treated conservatively

with appropriate supportive measures but his condition steadily deteriorated, as manifest by severe bleeding tendency, progressive hypertension, recurrence of coma and pulmonary edema. The response to digitalis therapy was far from satisfactory.

Because of extreme uremia and acidosis, the patient was transferred to the Naval Hospital on October 19, 1953, for hemodialysis with the artificial kidney. The procedure was without untoward incident, and the patient's condition remained stable for some eight hours. Then signs and symptoms of cerebral hemorrhage developed and the patient died within three hours of the onset of symptoms. At autopsy the clinical diagnoses of chronic pyelonephritis and cerebral hemorrhage were confirmed.

Comment: In this case, death was directly related to dialysis, presumably because of heparinization in the presence of severe bleeding tendency and pronounced hypertension secondary to basic and chronic renal infections. In retrospect, the artificial kidney had nothing to offer this particular patient and use of the procedure was contraindicated.

CASE 6. A 29-year-old woman was admitted by transfer from another hospital to the U. S. Naval Hospital, Oakland, on December 11, 1953, because of acute renal insufficiency following spontaneous rupture of the uterus one week earlier, which had necessitated emergency hysterectomy and multiple transfusions. Anuria promptly developed as the first evidence of lower nephron nephrosis. When seen in consultation by the author the patient was desperately ill with azotemia, acidosis and hyperkalemia secondary to acute renal failure. The surgeon who had operated reported a large hematoma in the base of the broad ligament on the left and another in the subcutaneous tissues of the abdominal wall. The patient also complained of blindness in the left eye, due to thrombosis of the central retinal artery.

Transfer to the U. S. Naval Hospital was on the seventh postoperative day. Because of severe potassium intoxication, hemodialysis was promptly begun and the procedure was continued six hours.

By the following night the patient appeared much improved. She was well oriented and the cardiovascular system appeared to be stable. The serum potassium began to rise again, however, and there was other evidence of biochemical deterioration. Dialysis for the second time appeared mandatory. Fortunately, spontaneous diuresis began on the tenth day (the second day after dialysis) and by the twelfth day the 24-hour volume of urine had reached 3,000 ml. In spite of this the electrocardiogram showed evidence of serious potassium intoxication which cleared belatedly without further resort to the artificial kidney. Toxemia due to persistent vomiting, dehydration and severe sepsis further complicated the diuretic phase. The prognosis was considered very poor due to multiple infections of the pelvic viscera with Pseudomonas and a flavochromobacterium highly resistant to all antibiotics except chloramphenicol.

Because of severe aphthous stomatitis, parenteral alimentation was employed for a period of one month. Carbohydrate and fat, given by vein, were the mainstays of nutrition. Amino acids were not tolerated. Multiple small transfusions were given in the early convalescent phase but not during the period of oliguria or during the uremia of early diuresis. Gradually, intravenous alimentation was discontinued as the patient began to tolerate small oral feedings. Energetic measures then were employed to insure nutritional rehabilitation.

After transfer of the patient to a civilian hospital hematemesis of some 600 ml. of blood from a stress ulcer of the duodenum developed suddenly. Ulcer therapy was begun promptly and in due time there was complete healing of the duodenal lesion. The patient was observed at two-month intervals thereafter. She regained strength and weight and when last observed was doing her own housework and taking care of two young children.

Comment: In this case acute renal insufficiency developed secondary to spontaneous rupture of the uterus and subsequent shock. The eventual recovery of the patient is ascribable to the cooperation between the surgeons, the internists, the physiologist, the bacteriologist and the biochemist, all of whom played equally vital roles. The artificial kidney was employed at the peak of uremia and well may have turned the tide in favor of eventual recovery.

CASE 7. A 67-year-old man entered the hospital on January 7, 1954, with history of abdominal pain, vomiting and obstipation of four days' duration. There had been a loss of 20 pounds in body weight in the preceding three months. Urination five or six times each night had been noted over the previous eight weeks. The clinical diagnosis of ruptured viscus was corroborated by x-ray films which showed fluid levels in the small bowel and free air or gas beneath the diaphragm.

At operation carcinoma was observed in the rectosigmoid, which had perforated. Some 500 ml. of brownish, foul-smelling fluid was aspirated from the pelvic peritoneum. An annular carcinoma was resected and colostomy was carried out. After the operation the urine volume fell to critically low levels characteristic of acute renal insufficiency. The maintenance of a conservative fluid intake regimen was complicated by the presence of peritonitis.

When first seen by the author on the seventh postoperative day, dehydration was evident; in addition to peritonitis there was extensive phlebitis of the veins of the left arm from multiple intravenous infusions. The blood urea nitrogen was 215 mg. per 100 cc., serum sodium 128 mEq. per liter, chlorides 79 mEq. per liter, and serum potassium 7.6 mEq. per liter. In the presence of this extreme uremia, adequate hydration was not attempted for fear of precipitating pulmonary edema. Use of the artificial kidney was recommended.

Hemodialysis was done for a period of six hours on the ninth postoperative day. The onset of diuresis more or less coincided with extracorporeal dialysis;

but in spite of this fortunate happenstance, uremia progressed apace. When drainage from the artificial anus began, three days after hemodialysis, uremia soon cleared spontaneously.

On the tenth day after dialysis, however, there was a sudden episode of cardiovascular collapse. It was held by consultants that this was due in part to adrenal cortical failure, and cortisone was administered in fairly large dosage. Within three or four days the patient began to have a "septic" temperature. The blood sugar levels rose to values ranging between 400 and 500 mg. per 100 cc.—in all likelihood owing to the diabetogenic action of cortisone. Azotemia had completely cleared by the twenty-ninth day after dialysis, but 35 days after dialysis the patient died of overwhelming infection of the peritoneum. The cause of death was conclusively demonstrated at autopsy.

Comment: This case is a striking example of the lethal effect of cortisone in the presence of an established infection; the infection became overwhelming after uremia had been controlled by the artificial kidney.

CASE 8. A man 20 years of age was admitted to the urology service of the U. S. Naval Hospital, Oakland, on December 9, 1953 with a two-week history of gross hematuria accompanied by only mild bilateral backache. After careful examination it was demonstrated by intravenous pyelograms that there was little or no function of either kidney. The patient was therefore transferred to the medical service.

Continued bed rest and a diet low in proteins brought about no improvement. Because of progressive anemia, blood was transfused cautiously a number of times but there was no change in the peripheral blood picture or in the course of glomerulonephritis. The patient gradually became extremely acidotic and uremic. Because of the remote possibility that hemodialysis might help, the artificial kidney was applied on January 29, 1954. Temporary clinical and biochemical improvement ensued. However, the urine volume remained extremely low and vomiting continued apace in spite of a ravenous appetite.

Convulsive seizures occurred for the first time on January 31, 1954. The blood pressure rose progressively to 200/120 mm. of mercury and to as high as 230/136 mm. The patient to all intents and purposes became blind, and bloody diarrhea developed from uremic gastroenteritis. On February 9 he became paraplegic; electrocardiograms indicated rapidly advancing potassium intoxication; respirations became rapid and gasping; and the patient died early on the morning of February 10.

Comment: The patient undoubtedly had acute glomerulonephritis or a fulminating exacerbation of chronic glomerulonephritis. Although hemodialysis with the artificial kidney improved the condition of the patient temporarily, it in no wise influenced the malignant course of the basic renal disease. In such cases extracorporeal dialysis is contraindicated if for no other reason than that it gives the physician, the patient and the family false hope.

CASE 9. A 33-year-old woman was admitted to the U. S. Naval Hospital on March 26, 1954. She had been seen in consultation at the Stanford University Hospital where she had first been admitted on March 17, 1954. There was a past history of cesarean section in 1951 because of placenta previa. Laparotomy was performed a year later for lysis of adhesions which had caused intestinal obstruction. Cesarean section was recommended again on March 17, 1954, and the patient stood the procedure well; the baby was normal and living.

About nine hours after operation, circulatory collapse occurred. The blood pressure fell to 70/0 mm. of mercury, the pulse was rapid and signs of vascular shock were present. Four units of blood were tranfused promptly—one bottle of Type O blood with neutralizing factor and three bottles of compatible A-1 Rh-positive. As soon as the circulatory collapse responded to this therapy the patient was returned to surgery and the abdomen was reopened. A retrocystic hematoma of some 1,200 ml. of blood was evacuated.

Oliguria developed. Acute renal insufficiency probably resulted from circulatory collapse, but incompatible blood was a possible etiologic factor. The patient was transferred to the Oakland Naval Hospital on March 26, 1954, because excellent conservative therapy had not alleviated lower nephron nephrosis. An electrocardiogram tracing at the time of admittance there was comparable to a continuous sine wave. The serum potassium was 10.2 mEq. per liter. Glucose and insulin were immediately given by vein and produced a temporary striking improvement in the conduction defect while the artificial kidney was being set up. Hemodialysis was carried out for six hours with fairly good biochemical response. Clinical improvement was encouraging, and on the day following dialysis (the eleventh day of oliguria) diuresis began spontaneously. However, serum potassium and blood urea nitrogen remained high over the next five days. (This is a rather frequent phenomenon in such circumstances and corroborates the observation that uremia does not reach its meridian until four, five or even six days after the onset of diuresis.) There was a loss of seven liters of fluid, approximately 488 mEq. per liter of potassium and some 300 mEq. per liter of sodium in the urine between the tenth and fifteenth days. Electrocardiograms then gave evidence of hypokalemia and it became necessary to administer potassium intravenously.

On the twenty-third postoperative day the patient had muscular fibrillations, twitching, athetoid movements, wide dilation of the pupils and mental confusion. There was increased neuromuscular irritability and carpal spasm. This was found to be due to alkalosis and low serum calcium. The patient responded promptly to the administration of additional calcium which corrected the electrolyte imbalance. Two attempts were made to hasten convales-

cence by means of blood transfusions but one attempt resulted in mild chill and the other an elevation in temperature and on both occasions, therefore, the procedure was promptly discontinued. The patient was discharged to return home on April 23, 1954, the thirty-fourth day following operation (the twenty-fifth day after dialysis).

Comment: Hemodialysis carried the patient over a very critical period of acute renal insufficiency that was characterized by potassium intoxication, and contributed much to eventual recovery. The syndromes of hypokalemia and hypocalcemia during diuresis required electrolyte replacement therapy and deserve special clinical emphasis.

CASE 10. A 23-year-old woman was admitted to the U. S. Naval Hospital, Corona, Calif., on April 26, 1954, because of acute onset of chills, fever and general toxemia of three days' duration. The prodromal history and symptoms were obscure. For three weeks the patient had applied a sulfa ointment daily to combat pruritus vulvae and vaginitis. For the last seven days of that period she had experienced loss of appetite, nausea and pain in the flank. Twenty-four hours before admission she had been a patient in an osteopathic hospital where, it was reported, body temperature of 107° F. was recorded and it was noted that she was anemic. Because of this "anemia" (cause undetermined) 500 ml. of whole blood (Type A, Rh negative) had been given. Shortly thereafter the patient became anuric and semicomatose. Her husband promptly arranged for her transfer to a military hospital.

Upon admission to the Naval Hospital at Corona, tentative diagnoses included: uterine infection after abortion, septicemia, lower nephron nephrosis, blood transfusion reaction and hemolytic anemia from sulfa medication.

The total urine volume over the next three days did not exceed 175 ml. in spite of energetic but ill-advised over-hydration—500 ml. of whole blood on April 27, 1954, plus 3,000 ml. of dextrose in water and another 1,000 ml. of blood the next day. On April 29 no urine was voided. Acidosis was extreme, uremia progressive and clinical deterioration fulminating in character. On April 30 urinary output again was nil, and the patient was transferred to the U. S. Naval Hospital, Oakland, for hemodialysis. Physical examination confirmed the findings of the admitting medical officer—cervicitis, pyometritis, salpingitis, peritonitis, septicemia, intestinal obstruction, and lower nephron nephrosis.

Because of acute renal insufficiency the patient then was managed conservatively for three days. Intensive antibiotic therapy was employed with minimum intake of fluid—800 to 1,000 ml. daily. Urine volume rose slowly, from nothing, then to 100 ml. and to 125 ml. on May 3. On that day the patient passed a tarry, liquid, black stool. Also there was intermittent epistaxis and spontaneous bleeding from the gums. Since this was the eighth day of extreme oliguria and because epistaxis, hemorrhagic gingivitis and melena are considered ominous complications of uremia, a decision was promptly reached to carry out hemodialysis. The artificial kidney was applied for six hours on that day without untoward incident. The biochemical response was adequate to carry the patient through this critical period of uremia. Diuresis developed spontaneously on the fourth postdialysis day and satisfactory clinical improvement occurred within a week. Convalescence was prolonged by persistent anemia, secondary to generalized sepsis and lower nephron nephrosis. When last observed, six weeks after dialysis, renal function was gradually returning to normal.

Comment: In this case, acute renal insufficiency may have been produced by a number of factors—abortion (self-induced), pelvic inflammatory disease, septicemia, drug toxicity and by shock from transfusion reaction. Regardless of the cause or causes the clinical syndrome is uniform and follows a familiar pattern of transient anuria, prolonged oliguria, progressive uremia, severe electrolyte derangements (with or without dangerous potassium intoxication) and concomitant biochemical, physiologic and clinical deterioration. Management in this case was complicated by severe, almost fatal sepsis. After the generalized infection was overcome by intensive antibiotic therapy, the problems of acute renal insufficiency continued unabated. They were solved, in part, by conservative management and by judicious extracorporeal hemodialysis with the artificial kidney.

DISCUSSION

Clinical management of acute renal insufficiency is usually difficult and at times discouraging[22] but a majority of patients will respond to conservative measures. The causes of death in the remaining minority are pulmonary edema, extreme uremia, fulminating potassium intoxication and overwhelming sepsis from infection usually introduced at the time of the original trauma, which in turn precipitated the lower nephron nephrosis. Conservative therapy with special emphasis on proper hydration of each individual patient (scrupulously avoiding overhydration) is the keystone of the therapeutic arch.[17] In lower nephron nephrosis total fluid intake per day must be limited to the volume of urine excreted in the previous 24 hours plus the volume of stool or vomitus together with a daily allowance of 700 to 750 ml. for water lost by evaporation through the skin and as water-vapor from the lungs. This "insensible water loss" is constant, seldom exceeds 800 ml. per day and must receive diligent attention during the entire phase of oliguria.

In the event diuresis does not come about spontaneously within seven to 14 days, extracorporeal hemodialysis may become mandatory to correct the severe electrolyte imbalance that occurs as a result of acute failure of the renal excretory mechanism.

Since uremia may not reach a meridian until five or six days after onset of diuresis, dialysis may be mandatory during the late phase of oliguria or the early stage of diuresis, if complicated by hyperkalemia (serum potassium levels of 8 to 11 mEq. per liter) or if there are other biochemical signs of metabolic bankruptcy.

However, the artificial kidney does not necessarily induce diuresis. It merely provides a "renal respite" until such time as regeneration of the tubular epithelium can initiate adequate urine flow spontaneously. Extracorporeal hemodialysis, therefore, is recommended and undertaken only with the hope that it will temporarily relieve the kidneys of an overwhelming load of toxic metabolites and thereby pave the way, indirectly, for spontaneous recovery of the excretory function. Thereafter, renal homeostasis may be restored gradually over the next six to twelve months.

Clinical management of the syndrome of acute renal insufficiency should be predicated on cordial and prolonged collaboration between the internist, surgeon, physiologist, urologist, biochemist and reliable laboratory technicians.

CONCLUSIONS

In reviewing these ten cases it becomes apparent that the use of the artificial kidney is not warranted in infectious processes or possible allergic states such as acute glomerulonephritis or an acute exacerbation of chronic nephritis. The author's experience with chronic pyelonephritis is likewise discouraging. Hemodialysis is seldom justifiable in the terminal stages of chronic uremia due to underlying irreversible renal disease. Nor should it be recommended when extreme hypertension is present, since heparinization of the patient may induce fatal cerebral hemorrhage.

The prime indications for hemodialysis are critical azotemia and rapidly progressive, fulminating potassium intoxication. Extreme metabolic acidosis reflects the failure of renal acid-base regulation and is another positive indication for dialysis. Application of an artificial kidney often is dramatically effective in acute potassium intoxication which otherwise may cause death in a few hours. Other indications for dialysis include prolonged coma from extreme barbiturate intoxication, overwhelming salicylism, and poisoning from bichloride of mercury.

There are definite contraindications to the use of the artificial kidney, notably: grossly active bleeding from fresh wounds; oozing of blood from the gastrointestinal tract or the uterus; subarachnoid or other intracranial hemorrhage. If uremia is secondary to acute pancreatitis, generalized peritonitis, overwhelming pneumonia, sepsis or septicemia, use of the artificial kidney is illogical since it can not eliminate the primary cause of uremia in such instances.

In the clinical management of acute renal insufficiency (lower nephron nephrosis) dialysis should never be considered a magic procedure which will insure clinical victory just before the last gun is fired; neither does dialysis *per se* induce diuresis; it merely tides the patient over and for a few days relieves the biochemical load on the badly damaged kidneys. Very careful clinical and laboratory supervision of the patient is required throughout the diuretic phase as well as during the phase of oliguria.[18] Nutritional, electrolyte and fluid balance problems often are extremely difficult in both phases. Overhydration of the patient with either whole blood or intravenous infusions of sodium chloride solution is insidious and may precipitate pulmonary edema. Washed, packed red cells have a high potassium content and by transfusion may contribute to potassium intoxication. This is especially pertinent because of the latent danger of hemolysis due to covert incompatibility. Fluid intake, by mouth or by vein, must be carefully calculated for each 24-hour period and adhered to rigidly, never exceeding the sum of "insensible water loss" (700 ml. to 750 ml.) plus the volume of the previous 24-hour urine, stool and vomitus. A daily intake of 100 gm. of dextrose in 1,000 ml. of water for injection, very slowly through an intravenous catheter, is usually adequate and will aid in the prevention of metabolic acidosis. By and large, blood transfusions during the critical phases of the syndrome are contraindicated and diuretic agents are mentioned only to be condemned.

In the six salvaged patients with lower nephron nephrosis following acute trauma, the syndrome of acute renal insufficiency was promptly recognized and conservatively treated before dialysis became necessary. Use of the artificial kidney was recommended for three patients because of advanced uremia with azotemia and for three others because of extreme potassium intoxication. Careful review of the histories in these six cases leads to conclusion that had the artificial kidney not been available and the procedure successfully carried out in competent hands, all six patients undoubtedly would have died. Such a statement, however, is not subject to proof because no patient can serve as his own control when life and death hang in the balance.

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ADDENDUM

Since this manuscript was prepared, an article appeared in the *Journal of Urology* (October 1954) by Keitzer, Ford, and Miller* entitled "Clinical

*Keitzer, W. A., Ford, M. L., and Miller, E. W.: Clinical experience with Skeggs-Leonards artificial kidney, J. Urol., 72:629-638, Oct. 1954.

Experience with Skeggs-Leonards Artificial Kidney." The authors reported results in 25 cases. Of ten patients in acute uremia, seven died after dialysis. Fourteen other patients in chronic uremia had hemodialysis with only temporary benefit, and all of them eventually died of chronic renal disease. One additional patient who had nephrosis with convulsions from chronic glomerular nephritis made an amazing and inexplicable recovery.

ACKNOWLEDGMENT

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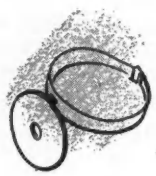

Injuries to the Knee

Reconstruction of the Collateral Ligaments

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• Review of a small group of cases in which the Mauck technique or a modification of it was used indicated that they were satisfactory solutions for many of the problems associated with reconstruction of the collateral ligaments of the knee. However, reconstruction of the collateral ligaments does not completely compensate for the lack of cruciate ligaments and a fully satisfactory repair is still being sought.

THE KNEE JOINT is subject to many derangements. Injury to the ligaments is probably the most common. Since the pain and swelling that follow injury to a knee are often no greater with extensive tearing of the ligaments than with relatively minor injuries, the serious nature of the injury is frequently not recognized at once. It is only after the acute pain and swelling has subsided and the patient begins to use the joint normally that the instability becomes apparent. It is important, therefore, that in all cases of injury to the knee adequate early treatment, surgical or otherwise, be given in order to obviate the necessity for late reconstructive operation. This presentation is concerned with the late repair of relaxed ligaments of the knee, but before considering the surgical technique it is necessary to make an accurate diagnosis of the derangement present in each case. Since the stability of the knee joint depends on several other factors besides the integrity of the ligaments, it is important to differentiate instability due to muscle weakness, fracture or internal derangement from tearing of the major ligaments.

In taking the history, an accurate record of the initial and succeeding injuries to the knee is important. It is important to distinguish locking or catching from actual giving way or buckling of the knee. Dislocation or subluxation of the patella also must be differentiated.

In examination of a knee, it is well to follow a definite routine, consisting of inspection, palpation, testing of the range of motion, testing the integrity of the various ligaments and measurement of the thigh, knee and calf at corresponding levels on the two legs. In testing for stability it is important to compare the affected knee with the sound knee, for there is a wide range of normal variation between persons.

ROENTGENOGRAPHIC EXAMINATION

In many cases no abnormality of the ligaments will appear in a roentgenogram of the knee, but the presence of fractures, of bone deformity or of bone fragments may give a clue to injury to ligaments. Many times the ligament pulls off a small fragment of bone at the point of insertion. Hence, bony fragments may be seen at the femoral epicondyles, the head of the fibula, the intercondylar notch or the posterior lip of the tibia. Not all bone fragments mean a ligamentous tear. The tibial spines may be broken and be seen in the intercondylar notch, but this does not signify that the anterior cruciate ligament is ruptured.

Roentgenograms may be taken with knee under strain to show gaping of the joint, but films of this kind are difficult to take and the position is painful for the patient. Of greater aid is to test the knee for medial and lateral instability under fluoroscopic visualization, which gives a much better idea of the relative laxity of the collateral ligaments than can be obtained by clinical examination. Also, the integrity of the cruciated ligaments may be tested more accurately.

In general the diagnosis in an average case is not difficult. Sometimes, however, difficulty arises in deciding whether the disability of which the patient complains is due to a torn meniscus, to a relaxed ligament or to a dislocating patella, when one or several of these conditions are present.

In the final analysis the diagnosis of a damaged ligament or ligaments depends upon the actual demonstration of laxity of the suspected ligament. Many persons have demonstrable laxity in the knee due to damaged ligaments but are not disabled. In a given case, therefore, the knee may be lax but the symptoms may be due to other derangement of the joint. The most common lesion to be differentiated is a tear of a meniscus. It is important, therefore, in the recurring episodes usual in such cases, to distinguish the locking which is typical of meniscus lesions from the giving way of ligamentous lesions.

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Clinically, it may be possible to elicit clicking or grating, or even to feel a hypermobile meniscus. Loose bodies also give rise to recurring attacks of locking and differentiation depends upon roentgenographic observations. Recurring dislocation or subluxation of the patella may be very confusing. Where actual dislocation occurs the patient may say something like "the knee goes out of joint or dislocates." Where the patella momentarily dislocates the patient may not know what happens. However, if the patella can be dislocated or almost so by the physician when making an examination, the patient will often indicate that that is the sensation he gets. Not infrequently, more than one lesion is present in a given case and it is important to evaluate each in relation to the symptoms. It is common to have tears of the anterior cruciate and tibial collateral ligament, and also the medial meniscus. The posterior cruciate ligament and tibial collateral ligament are also associated. The fibular collateral and anterior cruciate ligament are usually damaged together.

INDICATIONS FOR OPERATION

As to the indications for operation, the first requisite is that the patient have symptoms of instability of the knee occurring during the course of ordinary activity. (The author would not consider reconstructive operation on a football player with the sole objective of returning him to an active career in football.) Second, the knee should be completely recovered from previous injuries or operations. That is, the maximum expected range of motion and return of muscle power should have occurred before further operation is carried out. Third, operation should be limited to young persons without degenerative changes in the articular cartilage, since it takes a much longer time for return of muscle power and motion in older individuals.

The objective of operation should be to obtain freedom from pain, stability adequate for ordinary activities and a full range of motion. This may seem obvious, but various operative techniques used in the past have achieved stability but with limitation of motion or with pain or both.

TECHNIQUES

Many surgical techniques have been devised for restoring the stability of a knee. In 1917, Groves[5] presented a method for the repair of the anterior cruciate ligament. He used one of the tendons of the inner hamstring muscles passed through drill holes properly placed to reconstruct the damaged ligaments. Edwards[2] in 1921 presented a method for the repair of the fibular collateral ligament by means of a flap of fascia lata turned down and another flap from the biceps tendon turned up to reinforce the damaged ligament. Since then, many variations based upon the same principles have been used. These methods are based upon the theory that the affected ligaments are weak, and the transplants are designed to strengthen them. One objection to the methods is that it is very difficult to pull fascia or tendons through drill holes to obtain and retain the degree of tightness necessary to stabilize the knee joint. Others are that absorption of bone about the drill holes occurs and permits the ligament to slacken, that sutures stretch a little before healing is complete, that the fascia slips and, finally, that since fascia grafts or free tendons are avascular structures, they are prone to stretch during the process of revascularization.

Replacement of cruciate ligaments by the Groves technique has generally been disappointing. The author has not done the operation but has noted in cases in which the operation was carried out by others that a prolonged period of disability is characteristic and often there is finally a limited range of motion. The reduction in the positive drawer sign in those cases was not striking. It would seem logical to question whether a piece of avascular fascia or tendon, which is devoid of synovial covering, will ever survive within the knee joint. There is also the possibility that it acts as a foreign material in the joint to produce irritation. Finally, it is owing to a complex arrangement of fibers of the cruciate ligaments that they can be tight in many phases of flexion and extension; and it is impossible to duplicate this arrangement by present techniques.

By 1936, it was generally accepted by orthopedic surgeons that repair of the cruciate ligaments was unsatisfactory and not necessary. In that year Mauck[5] reported the operation which bears his name. He did not repair the torn cruciate ligament but, believing that the main cause of instability in a knee is a relaxed collateral ligament rather than a weak one, he transplanted the tibial insertion of the tibial collateral ligament distally, thus restoring tension to the ligament. The author has used this operation and the results in general have been satisfactory.

In July of 1950 the author modified the Mauck operation by transplanting the femoral insertion upward instead of the tibial insertion downward, which simplified the operative technique and made the operation adaptable to both the tibial and fibular collateral ligaments.

In more recent years there has been a renewed search for other methods to stabilize damaged knees. Smillie[7] used the medial meniscus to replace a torn anterior cruciate ligament. This technique needs further trial for proper evaluation.

Thus far only the static phase of stabilization of

TABLE 1.—*Data on nine cases of surgical repair of ligaments of the knee*

Case	Date	Age and Sex	Cause of Injury	Ligament Injured: Anterior Cruciate	Tibial Collateral	Fibular Collateral	Meniscus	Repair Type	Follow-up Time	Results: Motion	Degree of Instability*: Anteroposterior	Lateral
1.	6- 2-42	19 M	Football	+	+			Mauck	5 years	Normal	1	1
2.	7-30-43	16 M	Football	+	+		+	Mauck	5 years	Normal	1	0
3.	6- 7-45	32 F	Fall		+			Mauck	6 months	Normal	1	0
4.	4-22-46	20 F	Sport		+		+	Mauck	17 months	40° to 175°	1	1
5.	7-27-46	22 M	Football	+		+		Plastic	4 years	Normal	2	3
6.	8- 5-46	20 M	Football	+	+		+	Mauck	7 months	Normal	2	0
7.	1-11-49	20 F	Football	+	+	+	+	Mauck	15 months	Normal	3	2-3
8.	2-19-49	23 F	Auto accident	+		+	+	Black	4 years	90° to 180°	1	1
9.	7-16-50	30 F	Riding horse	+		+	++†	Black	3 years	Normal	1-2	1

*Degree of instability is in a range of 1 for least to 4 for greatest.
†Both menisci torn.

the ligaments of the knee has been considered. Recently more attention has been given to the dynamic factors affecting the stability of the knee. Hauser,[3] Helfet[4] and Smillie [7] have transplanted the patellar tendon to a more medial position on the tibia. The added external rotary force tends to stabilize the knee. Augustine[1] reported a technique for replacement of the posterior cruciate ligament in which a strip of the patellar tendon still attached to the patella proximally is passed through a drill hole in the superior surface of the tibia and out below the tibial tubercle. Contraction of the quadriceps then pulls the tibia forward in relation to the femur, thus preventing the backward displacement which is characteristic of posterior cruciate lesions. Augustine also described use of the semitendinosus detached distally, pulled upward and then passed downward through the intercondylar notch and into a drill hole in the tibia in such a way as to have a dynamic action replacing a torn anterior cruciate ligament. The author has had no experience with the foregoing methods. Certainly a satisfactory method of reconstruction for the cruciate ligaments is needed, and these methods seem to be an interesting approach to the problem.

The question of dynamic versus static ligaments is open to debate. Believing that the function of the ligaments is to provide stability to the knee in phases of flexion and extension when the muscles are inactive, the author finds it difficult to see how these transplanted tendons can supply the required stability to the joint. It is to be hoped that further clinical trial will supply the answers.

POSTOPERATIVE CARE

After operation a long leg cast should be worn for six weeks, which is the minimum time for healing of the reconstructed ligaments. It is to be expected that after this period of immobilization there will be considerable stiffness of the joint and atrophy of muscles. At the end of six weeks either a jointed cast or a long leg jointed knee brace is worn and active exercises are begun. This support is worn until muscle power is adequate to protect the knee during ordinary activities. Heat and resistance exercises are continued until muscle power has returned to normal.

Data on injuries, the kind of repair and the results in nine cases are given in Table 1.

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Decidual Reaction of the Cervix

A Review of 27 Cases

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• *Decidual reaction of the cervix is a benign growth produced by the hormones of pregnancy. These reactions or changes in the cervix are present in about 20 per cent of normal pregnant women. They may look like cancer but are not cancer. They are benign lesions. Bleeding is a common symptom and may occur at any stage of pregnancy. The presence of decidual reaction does not predispose to spontaneous miscarriage. In most cases no treatment is required; in a few light cauterization may be needed to control bleeding. Any suspicious lesion should be biopsied to rule out malignancy. By microscopic examination any experienced pathologist can differentiate a decidual reaction from cancer. The consensus of opinion is to let the pregnant woman deliver, normally, with this benign lesion, for it disappears after the baby is born. If cancer is found during pregnancy, it should be actively treated.*

DECIDUAL REACTION of the cervix is reported to occur in approximately 20 per cent of cases in which biopsy specimens are taken from that area during pregnancy, but the true incidence of this condition is undoubtedly much higher.[1, 3, 6] Clinically the lesions may resemble carcinoma of the cervix. Although differentiation is not difficult for experienced observers, in some cases reported in recent years the initial microscopic diagnosis was anaplastic carcinoma of the cervix; later the diagnosis was corrected to extensive decidual reaction.[5] (Figure 1).

The chief symptoms are "spotting" and bleeding. The latter may be spontaneous or may follow intercourse, douching or pelvic examinations and in the first trimester it must be differentiated from the bleeding of threatened abortion or of extrauterine pregnancy. If there is bleeding in the last trimester of pregnancy, placenta previa and abruptio placenta must be considered in differential diagnosis.

The cause of decidual reaction of the cervix is unknown. However, the condition probably arises because certain stromal cells of mesenchymal origin respond to the hormones liberated during pregnancy.[1, 6, 7] The appearance of this ectopic decidua outside the uterine cavity could not be explained in any of the cases in the series herein reported as resulting from endometriosis or adenomyosis present at the site of the lesion. Some investigators have expressed belief that inflammatory lesions, erosions and polyps may predispose to the lesion.[4, 6] As a rule, there is a sharp line of demarcation where the columnar mucous epithelium of the cervical canal meets the stratified squamous epithelium of the portiovaginalis. If there is erosion of the cervix, the columnar epithelium extends down and may account for the extension of the decidua vera to the portio. This condition could not account for the isolated lesions that sometimes occur on the cervix and the upper vagina.

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The gross lesion may appear, clinically, in various forms:

1. As an endocervical polyp with a pedicle or as a sessile polyp.

2. As a circular, rim-like tumor elevation partially or entirely around the os at the columnar squamous junction.

Figure 1.—Section from decidua of cervix of a woman three months pregnant. Diagnosed as squamous cell carcinoma. (A) Normal squamous epithelium, (B) decidual cells.

3. As a granular proliferative papillary or fungating mass on one or both lips around the external os.

4. As a pearly, shiny, gray to yellow tumor on the cervical or vaginal mucosa. There may be several distinct tumors or just one.

5. As a simple hypertrophic erosion undistinguishable from the common erosion that occurs in pregnancy, except that it bleeds more easily on palpation.

The histogenesis is fairly definite. The decidua cells in biopsy material from the cervix are of mesenchymal origin and by serial biopsies can be traced from the fibroblastic stroma cells. Postpartum, these same cells revert back to stroma cells, usually within two weeks.

The principal changes noted in microscopic observation occur in the fibrocytes between the smooth muscle fibers of the cervical stroma. The usually compact elongated cells change to solid sheets of enlarging polygonal cells. The enlarged cells coalesce and occasionally form microcysts. These enlarged cells have larger than normal amounts of cytoplasm, which is foamy and vacuolated. The cell masses are more compact near the surface; in the deeper areas, they are elongated and often surrounded by the fluid of edema. Quantitatively, the reaction may vary greatly; many cells or only a few may show the changes. Scattered throughout the masses of decidual cells are numerous blood vessels distended with erythrocytes. These blood vessels (capillaries and arterioles) are also altered in decidual reaction. The vessels may be rounded or slit-like, but the layer of lining endothelial cells is usually the only clearly recognized vascular structure. The connective tissue cells of the vessel walls show the same changes as the stromal cells and in fact blend indistinguishably with them.

An inflammatory reaction, often quite intense, is usually present in most of the decidual areas but to a greater extent in the submucosal region (Figure 2). The predominating cell is the polymorphonuclear leukocyte, although often many mononuclears are present. This reaction is not of the granulomatous type but is almost always associated with ulceration of the cervical mucosa. At times the vascular congestion is so pronounced that actual sinusoids are not rare, and there seems to be an extravasation of erythrocytes into the stroma. The endocervical

Figure 2.—Section (×100) of decidua after eight months of pregnancy: (A) inflammatory reaction, (B) mature decidual cells.

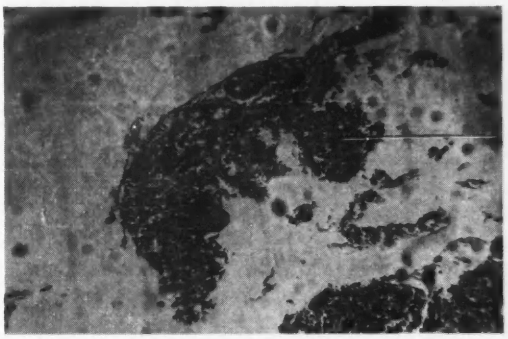

Figure 3.—Specimen of decidua of cervix nine days postpartum (×100). The line at right points to several small areas of decidual reaction.

Figure 4. — Specimen taken nine days postpartum (×430). The line points to regressing decidual reaction.

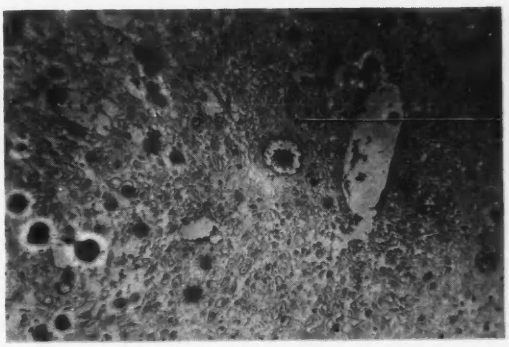

Figure 5.—Specimen removed eleven days postpartum (×100). The line points to regressing decidual cells of fibroblastic type.

glands are prominent, and the cells show active secretion of mucus. There does not appear to be any correlation between the degree of inflammation and the extent of the decidual reaction. The inflammation does not appear to be a prerequisite, as decidual reaction occurs in tissue where there is no sign of inflammation (oviduct, ovary, peritoneum, appendix, broad ligament and hernia sacs).

In a series of 27 pregnant patients with decidual reaction of the cervix who were observed by the authors, 19 had associated erosion or endocervicitis. Eight of the patients had a clean cervix except for isolated decidual lesions. Only one patient had proved endometriosis. In one patient the cervix was hypertrophic with extensive multiple tumor elevations (deciduomas) on the cervical mucosa and the vaginal vault, distinct from the cervical erosion present.

The largest mass observed at term was a yellow elevated body about 1 cm. in thickness on the anterior cervical lip. Specimens for biopsy were taken from the mass during the prenatal period, at term and in the postpartum period. In histopathologic examination of a specimen removed on the ninth postpartum day decidual reaction was observed still to be present.

The earliest that specimens were taken for biopsy in the present series was at five to six weeks from the last menstrual period. In all cases the lesions had disappeared by the sixth week postpartum. Three of the patients in the series had spontaneous abortion, in one abortion was induced and in one rupture of ectopic pregnancy occurred. Delivery was premature in three cases; in two of the three it was spontaneous and in the other was due to abruptio placenta.

The regression of decidual cells to the original fibroblastic cells, the authors believe, takes place between the tenth and sixteenth day postpartum. Biopsy specimens taken on the ninth, eleventh, and the seventeenth postpartum days in the present series tended to support this belief (Figures 3, 4, 5).

Decidual reactions should be treated conservatively. Endocervical polyps are treated in the usual manner by twisting them off with a clamp and, if necessary, applying light cautery to the base. Often a Gelfoam plug will control bleeding. Bleeding that may occur incident to removal of tissue for biopsy may be treated in the same way.

Papanicolaou examination of material swabbed or scraped by wooden spatula from the lesions does not aid in diagnosing decidual reactions except in that they are negative for malignant disease.

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Laboratory Technicians

The Clinical Laboratory Law and Its Meaning to Private Physicians

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• The present laws and regulations relating to clinical laboratories in California are the outcome of over a quarter century of cooperative development.

The medical profession, public health department, laboratory workers, and the legislature have worked together in this development.

At first the system of certifying technicians and laboratories was on a voluntary basis. The clinical laboratory law in effect legalized and made generally applicable a system which had already been accepted voluntarily.

The application of the clinical laboratory law provides physicians a reasonable assurance that competence and reliability will prevail in clinical laboratory operation.

Of great importance is the conduct of proper training programs by approved laboratories.

Since modern medical practice is so dependent on accurate clinical laboratory work it is essential that special effort be directed by physicians toward influencing young people to enter the profession of medical technology.

THERE WAS A TIME when medical practice depended almost entirely on the power of observation and on the application of personal experience in the diagnosis and treatment of disease. Regardless of the diagnostic acumen of the physician, however, the diagnosis often was missed because of inadequate information. As time went on, many other factors were added to those fundamental facilities. The physician, instead of relying upon his own skills alone, drew assistance from the specialized abilities of others.

In the course of this development, the volume of knowledge relative to disease processes and how to measure them expanded beyond the belief of earlier generations. It became necessary to understand the processes of deranged anatomy and deranged physiology, and also the life cycles and metabolic processes of parasitic agents. The methods for determining these derangements require complex procedures through use of precise methods.

In this way the private physician came to need more than his own personal skill. He needed data from scientific measurements done by others than himself. He became the coordinator of a vast amount of scientific information in relation to his patients. As a corollary to this, he had to be assured that those who made the determinations were competent and that they used reliable instruments and methods.

Assistance to him in this assurance constitutes one of the functions of public health practice. As laboratory science has become more complex, the medical profession has, from time to time, recommended regulations designed to insure accuracy. These have received legal status through legislative action. The administration of these regulations has been carried on as part of the program of public health departments.

In California, the Clinical Laboratory Law as it exists today is the outcome of over a quarter century of cooperative development among components of medicine, including public health, and the legislature. As long ago as 1923, the State Board of Health authorized the director of the State Hygienic Laboratory to inaugurate a system of inspection and certification of diagnostic laboratories, both public and private.[3] At first the system of examining and certifying clinical and public health technicians was conducted on an entirely voluntary basis. This system of voluntary acceptance of approval extended also to laboratories. By the time the first law was proposed, this voluntary system had become generally accepted by laboratory directors and technicians throughout the state. The law, in effect, legalized and made generally applicable a system of examination and certification which had already been operating on a voluntary basis for 15 years. The Clinical Laboratory Law which was made effective in 1938 was a cooperative venture in which all interested organizations participated. The law was revised in 1951 in keeping with advancements of knowledge and experience in clinical laboratory operation.

Since 1941, there have been two committees serving in an advisory manner to the State Department of Public Health in the administration of the law. These committees are composed of five members, each with representatives from the universities, pathologists, technologists and technicians.[7]

Presented before the Section on Public Health at the 83rd Annual Session of the California Medical Association, Los Angeles, May 9-13, 1954.

TABLE 1.—*Chronology of activities in licensing of clinical laboratories and clinical laboratory personnel*

Date	Clinical Laboratory	Clinical Laboratory Personnel
Before 1925	No supervision	No supervision
1925-1937	Voluntary approval of clinical laboratories	Voluntary certificates in individual subjects for technicians
1937—Clinical laboratory law passed		Licenses for technicians and technologists required
1938—State Board of Public Health regulations adopted		Licensing initiated with blanketing in of laboratory workers
1941	Voluntary approval of clinical laboratories abandoned	
1942		Discontinued issuance of certificates in individual subjects
1947—State Board of Public Health regulations amended		Licensing in individual subjects; requiring graduate degree; reestablished
Laws and regulations amended 1951, effective January, 1952	Laboratory permits required	Registration of clinical laboratory trainees required

TABLE 2.—*California licenses issued for clinical laboratory technicians and technologists by year, 1938-1953*

Year	Technician	Technologist
1938	2	178
1939	326	32
1940	76	10
1941	228	62
1942	212	7
1943	182	4
1944	154	11
1945	183	8
1946	365	12
1947	547	26
1948	335	14
1949	178	3
1950	393	7
1951	418	9
1952	657	9
1953	526	13
Total	4,782	405

The law, as at present constituted, defines a clinical laboratory as follows: "Clinical laboratory means any place, establishment, or institution organized and operated for the practical application of one or more of the fundamental sciences by the use of specialized apparatus, equipment, and methods for the purpose of obtaining scientific data which may be used as an aid to ascertain the presence, progress, and source of disease in human beings."[4]

There are certain exemptions provided in this law, one of which recognizes the relationship between a physician and his patients in his private practice. Thus, the law does not apply to a clinical laboratory operated by "an individual licentiate of the healing arts for laboratory work performed on his own patients and within the scope of his license privileges." This does not permit, however, the laboratory to receive direct or indirect referred work from any other source. Other exemptions include laboratories operated by the state or federal government. Those permitted to perform tests in clinical laboratories are physicians, technologists, technicians, and trainees. Only a physician or a technologist may direct a laboratory.

Any of the above groups may do all procedures involved in laboratory operation. This includes skin puncture, or venipuncture for collection of specimens, and the performance of tests. It does not, however, include spinal puncture, except, of course, by a physician.[2] The activity of trainees is modified by the provision that their work be done under direct supervision of a licensed person, and there may be no more than one trainee per licensed person, and no more than two in any laboratory except where a training school has been approved.

Laboratories are operated under permits issued by the State Board of Health on recommendation by the Department of Public Health, after inspection of their operation and equipment. Licenses and permits are renewed annually.

Table 1 lists chronologically the various phases in the development of the present clinical laboratory act.

Since clinical laboratory practice demands accuracy and precision of its operators, it is important to know what kind of persons are doing the work, and something about their training and their numbers.

Table 2 lists the number of licenses issued to technicians and technologists each year since 1937.[8] In general, the number of technician licenses issued has steadily increased each year since the post-war years of 1946 and 1947. There is noted a sharp peak in numbers immediately following the war which indicates the return of service men to civilian life.

The terms technician and technologist should be defined at this point, since not everyone is familiar with the nomenclature as it is applied in California.

The California Business and Professions' Code describes a clinical laboratory technician in Sections 1261 and 1262.[4] For the sake of brevity, only certain items in that description will be dealt with here.

In general, it may be said that five years are required after high school graduation before an individual is qualified to take the examination for licensure.

These five years may be spent in several ways. The recommended procedure involves four years of college with a degree of bachelor of arts or bachelor of science and a major in bacteriology, biochemistry, medical laboratory technique or essentially equivalent subjects. This academic experience is then followed by actual clinical laboratory work in an approved laboratory as a trainee for a period of up to one year.

The length of time in traineeship depends on the content of the curriculum of the college from which the degree was received.

If the person completes only three years of college, including certain required subjects, then two years of traineeship is required.

If only two years of college is completed, with the required subjects, then three years of traineeship must be fulfilled. It is now possible to receive this minimum two years of required college instruction in most of the 75 junior colleges of the state.

In the past, high school graduates with five years of approved traineeship were qualified to take the examination. However, the present law has raised educational standards to a minimum of two years of college. This will be mandatory on and after January 1, 1957.

Now to consider the definition of clinical laboratory technologist. It must be remembered that this definition is based on the California statute (Sec. 1260).[4] Again, reference will be made only to the high points in this legal definition.

Nine years following high school graduation is the minimum time requirement to qualify for the technologist examination. These nine years must include four years of resident instruction leading to a degree in an approved college or university. The courses shall contain certain minimum numbers of hours in pertinent subjects. There must also be five years of practical experience in an approved clinical laboratory, at least one year of which shall immediately precede admission to the examination. This examination includes written, practical and oral portions.

There are two exceptions which may be invoked in the application of the five years of experience. A master's degree in fundamental medical sciences may be substituted for one year of experience. A doctor of philosophy degree, on the same basis, may be substituted for two additional years.

It will be noted that technologists have considerable preparation before admission to the examination. This is considered essential, since technologists are the only persons, aside from physicians, who may operate and direct clinical laboratories. It has been recognized that laboratory direction by physicians, preferably specialists in pathology, is the desirable situation. However, this is impossible at present, for there are not enough pathologists or other physicians interested in laboratory medicine to cover the various communities needing clinical laboratory service. The technologist, therefore, fulfills an important function in assisting practicing physicians in this essential field of medicine.

TABLE 3.—*Clinical laboratory technician and technologist licenses (California) by sex*

License	Issued 1938-1953 — Total	Issued 1938-1953 — Per Cent Male	Issued 1938-1953 — Per Cent Female	Active in 1953 — Total	Active in 1953 — Per Cent Male	Active in 1953 — Per Cent Female
Technician	4,782	27.6	72.4	4,003	28.1	71.9
Technologist	405	46.4	53.6	339	45.4	54.6

TABLE 4.—*Certificates of proficiency granted and limited licenses issued at time law became effective (California)*

License or Certificate	Issued — Total	Issued — Per Cent Male	Issued — Per Cent Female	Active in 1953 — Total	Active in 1953 — Per Cent Male	Active in 1953 — Per Cent Female
Limited licenses	395	19.7	80.3	157	19.1	80.9
Certificates of proficiency	2,451	20.9	79.1	109	16.5	83.5

Note: Certificates of proficiency granted 1928-1942.

Sixty-seven and one-tenth per cent of all persons now licensed as technicians are college graduates, and 89.5 per cent have had at least some college education.

The amount of formal education is related to the ability to pass this examination: 91.3 per cent of those with college degrees pass; of those with some college training, but without a degree, only 72.9 per cent pass; of those with only high school training, 53.3 per cent pass.

Of the 4,255 persons who have taken the technician's examination during the past eight years, 2,481 or 58.3 per cent had college degrees.

Most clinical laboratory technicians are women, but the proportion has decreased slightly in recent years. Table 3 shows the relative numbers of men and women holding licenses as technicians and technologists. Seventy-two and four-tenths per cent of the technicians but only 53.6 per cent of the technologists are women.

Before the passage of the law in 1938, and for a limited period afterward, certificates of proficiency were issued in individual subjects. At the time the law went into effect, certain candidates were issued licenses in limited fields as part of the blanketing-in procedure. Data concerning these certificates and limited licenses are shown in Table 4. It will be noted that a majority of these certificates and licenses are no longer active, principally due to the fact that the persons to whom they were issued have obtained full licensure.

Besides clinical laboratory technicians and technologists, there remains another very important group to describe—clinical laboratory technician trainees. It is upon this group that the laboratory depends for continuity of operation and for expan-

TABLE 5.—Laboratories with permits, laboratories approved for training, and approved laboratory training schools, with number of trainees in each category (California, 1953)

	Total	Type of Laboratory: Hospital No.	Hospital Pct.	Other No.	Other Pct.
Laboratories with permits	843	315	37.4	528	62.6
Laboratories approved for training:					
Total laboratories approved	346	167	48.3	179	51.7
Total trainees as of Dec. 1953	392	263	67.1	129	32.9
Clinical laboratory—limit 2 trainees:					
Laboratories approved	321	144	44.9	177	55.1
Trainees as of Dec. 1953	260	144	55.4	116	44.6
Laboratory training school—one or more trainees:					
Laboratories approved	25	23	92.0	2	8.0
Trainees as of Dec. 1953	132	119	90.2	13	9.8

TABLE 6.—Colleges and universities with curricula directed toward medical technology (California, 1953)

College or University	Number Enrolled	Enrollment Capacity (Estimated)
State universities (U.C., U.C.L.A., Med. School, San Francisco)	239	370
State Colleges (7)	253	350
Private colleges and universities (6)	136	237
Total	628	957

sion. It is for this class of worker that laboratory directors must take the initiative in providing training facilities. Time required in training varies as already described, depending on prior scholastic achievement.

Trainees are expected to work as technicians in every way, except that they are continuously under supervision, and are never on duty alone. Furthermore, no one may make a career of being a trainee; two years is the maximum time allowable, after meeting minimum qualifications, before a license must be obtained. It should be pointed out that trainees are paid for their work, usually an increasing amount, as they advance in experience.

Regulations contained in the California Administrative Code are precise in their description of the kind of training and experience to be provided for technician trainees.[4]

Laboratory directors may not accept trainees until the laboratories have been evaluated and approved for training by the State Department of Public Health. This evaluation includes equipment, personnel of the laboratories and scope of activities.

There are two kinds of training programs recognized. One is designed for the smaller laboratories, and under it not more than two trainees may be included, and not more than one if there is only one licensed person in the laboratory. The other kind of training program is for laboratories classified as training schools. In these schools, as many trainees may be registered as there are licensed personnel on duty. The schools must follow minimum schedules of experience and instruction and must have adequate equipment and volume and diversity of work.

Because the matter of training is of such great importance to the future supply of technical workers, the status of these programs will be discussed more extensively here.

Only 346 of the 843 approved clinical laboratories are conducting training programs (Table 5), and even they are not operating to the full capacity of their training potential. Therefore, in terms of numbers of laboratories participating in training, only about 41 per cent of the training potential is being used. Furthermore, in the 346 laboratories approved for training at the end of 1953, there were only 392 trainees listed in reports to the department. Since, in general, each laboratory may be approved for two trainees, the training in even these laboratories falls short of full capacity.

The principal source of trainees is the colleges and universities of the state. Table 6 shows the kinds of schools and colleges within the state that maintain curricula for medical technology. Also shown is the approximate enrollment in these colleges as compared with their capacity. While enrollment capacity is estimated at 957, only 628 students are actually enrolled. Thus, it is seen that both the educational institutions and the clinical laboratories are operating considerably below their capacity for training future technicians and technologists.

After this consideration of educational and training programs, the question follows as to whether or not these programs are producing sufficient personnel to meet the needs of our clinical laboratories.

Only 779 out of 4,782 persons have failed to maintain their licenses in an active state during the past 16 years. This represents a total loss of about 16 per cent. However, not all the licensed individuals are active as technicians. Many of them, for various reasons, are not actually engaged in laboratory work; but they represent a potential which is available in case of necessity.

It has already been noted that approximately 500 new licenses have been issued each year in recent years. Yet the technician shortage still appears to be acute. It thus seems evident that at least 500 to 600 new licentiates must be added each year to fulfill California's needs. To accomplish this, more students will have to be enrolled in courses of medical technology in educational institutions, and more facilities for trainees will have to be activated in the clinical laboratories.

Because of the difficulty in maintaining an adequate supply of qualified technicians, proposals are

occasionally received for establishing classes of technicians at lower levels of training. It is stated that these workers with less training could perform so-called simple laboratory procedures such as urinalysis and the common blood determinations. In consideration of these proposals, it should be stated that no laboratory procedures are looked upon as "simple." There is too much involved to allow performance of these tests to deteriorate to the mere pouring together of specimens and reagents, and empirically noting results.

In this connection, it has been noted that a few private schools have set up curricula designed to prepare individuals, often with limited background, for jobs as office assistants to professional people. These courses include some bookkeeping instruction, some simple nursing procedures, public relations principles, as well as a few of the more common laboratory tests. The state Attorney General has ruled that insofar as the teaching of laboratory technique is concerned, these schools are operating illegally.[2] Only where the laboratory technology training is given to prepare students for ultimate licensure is that training within the law. This ruling is further evidence of the importance of adequate training and experience in preparation for a career in medical technology.

What might be termed "a scientific conscience" is essential to successful performance in the laboratory, and this can only be developed through high level teaching and experience. The technician must have a deep appreciation of the importance of accuracy, and of the importance of the tests to the physician, as well as a pride in his role as a professional member of the medical team.

It has been stated already that individual physicians in their practice are exempt from the provisions of the clinical laboratory law so long as their laboratories perform tests for their own patients only. In spite of this exemption, there is an increasing use by private physicians of licensed technicians. As more such technicians become available, this practice will no doubt become more general. Unless a physician has the time to perform his own laboratory tests, good practice dictates that he have a licensed technician for this work.

As a corollary to this, it should be stated that private physicians may undertake premarital[5] and prenatal[6] serologic tests in their own offices on their own patients only when their laboratories are approved for this purpose by the State Department of Public Health, and this approval stipulates that all technicians performing such tests must be licensed.[1]

It is clearly established that modern physicians are dependent on clinical laboratory techniques for accurate diagnosis and for maintaining successful treatment. Therefore, success in medical practice demands that clinical laboratory work be done by well qualified technicians.[9]

To fill the need for qualified persons, it is necessary that many more of the young people of today be guided toward the profession of medical technology. Competition from other sources is keen. The training period is long, and the remuneration of these workers is small in the early stages of their careers. These factors are definitely a handicap to recruitment. Thus, it becomes a major responsibility of all private physicians to make the period of traineeship after academic training as attractive as possible. Salaries must be on a competitive level with other fields. Personal interest by private physicians will develop in technicians and trainees pride in their work, and personal satisfaction in being related to medical practice.

Unless aggressive promotion in this field is exerted by private physicians, it will be increasingly difficult to provide medical practitioners with the assistance available through scientific laboratory methods.

Some physicians are already taking time off from their practices to give lectures and instruction to students in state colleges. It is this sort of individual effort which stimulates young people to continue their studies in this field, and also to draw new recruits into the profession. Other physicians in the course of their daily rounds may drop in to the laboratory and indulge in spirited discussions with the technicians and trainees. It is through this kind of relationship that physicians may hope to compete with other private industry in influencing competent young people to enter the field of medical technology.

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The Epidemiology of Poliomyelitis

A Study of An Outbreak in Payson, Utah, 1951

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• *In an unusually intense and severe outbreak of poliomyelitis, close personal contact, either directly or through intermediaries, with persons with poliomyelitis appeared to be the only significant factor common to the majority of the cases studied.*

ALTHOUGH MUCH EVIDENCE has appeared in the earlier literature[3, 9, 10, 14] regarding the spread of poliomyelitis by direct person-to-person contact, based on "shoe leather" epidemiology, relatively little has appeared in recent years.[1, 2] More attention has been paid to the route of infection — as to whether it is gastrointestinal or respiratory. Attempts to implicate or establish common sources such as sewage, water, milk and flies have tended to predominate in the epidemiological literature of the past 15 years. As an unusual opportunity occurred recently to study, in detail, an outbreak of poliomyelitis of extreme severity and intensity in a relatively small community, it was felt desirable to record the data that could be obtained by "shoe leather" methods concerning this outbreak.

The present report concerns a portion of an epidemiological survey made in conjunction with the evaluation of gamma globulin in the prophylaxis of poliomyelitis[4, 5, 6, 7] carried out under the direction of Dr. W. McD. Hammon in Utah County, Utah, in 1951. Gamma globulin, however, probably did not affect the course of this outbreak since it had practically terminated before the injections were given.

All cases of poliomyelitis occurring in Utah County after September 7, 1951, were reported directly to the study group as well as to the Utah State Department of Health, and reports of earlier cases were made available to the group. Several previously unreported cases were discovered during the investigation. An unusually close working agreement was maintained with the physicians in the area. All patients were visited by a physician member of the group, and muscle evaluation was done by Miss Miriam J. Jacobs, a physical therapist working with the team. Each home was visited at least once, and usually two or more visits were made in order to interview the relatives with regard to contacts as well as to obtain other epidemiological data.

The present report concerns only the town of Payson, as in this town it was apparently possible not only to trace the disease through the community but to identify presumptively the source of the initial infection with some degree of certainty.

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The town of Payson, population 3,979, is located in the southern portion of Utah County. The major industries are farming and steel manufacture, and many of the residents commute to the nearby factories. The water supply for the community is taken from a stream in a nearby canyon and no chlorine treatment is used. Analysis of this water during 1951 showed *Escherichia coli* present in significant amounts in 17 of 27 samples tested.[11] Irrigation water was derived from a similar source and was routed in open ditches through the town to provide irrigation for gardens, lawns and trees in the community. These ditches also served as play areas for the children, with or without parental consent or knowledge. A city-operated sewage system was in use, averaging 6.6 persons per connection. The sewage was inadequately treated in an Imhoff tank designed for 600 persons.[8] The effluent was discharged into nearby Utah Lake, the largest body of water in the region, which was already grossly contaminated by sewage from other towns in the region.[8]

During the previous ten-year period Utah County had experienced one major poliomyelitis outbreak —in 1943, with a rate of 141 per 100,000—and the disease had been present in the county during each of the other years in rates ranging from 16.1 (1942) to 66.1 (1949) per 100,000. The town of Payson, however, had been almost free of the disease during this period. Only one case was reported from Payson in each of three years during the ten-year period. These occurred in 1946, 1949 and 1950. Checking these data with the crippled children's organization suggested that the actual incidence of the paralytic disease did not exceed the reported incidence significantly.

For several reasons this city made an ideal area for epidemiological study. The 1951 outbreak of poliomyelitis in Utah County did not involve Payson until almost one month after its onset in other cities of the area. Consequently, the majority of the parents restricted the activities and contacts of their

TABLE 1.—*Poliomyelitis, Utah County and Payson, by age of onset*

Age at Onset (Year)	Utah County Excluding Payson			Payson			Utah County Total		
	No. of Cases		Per Cent	No. of Cases		Per Cent	No. of Cases		Per Cent
0-1	3			0			3		
1	5			1			6		
2	8	34	35.4	0	5	22.7	8	39	33.1
3	7			0			7		
4	11			4			15		
5	8			3			11		
6	8			3			11		
7	8	32	33.3	3	11	50.0	11	43	36.4
8	4			1			5		
9	4			1			5		
10-14	14		14.6	3		13.6	17		14.4
15-19	6		6.3	0			6		5.1
20+	10		10.4	3		13.6	13		11.0
	96		100.0	22		100.0	118		100.0
Modal age	4 yr.			4 yr.			4 yr.		
Median age	6.2 yr.			6.7 yr.			6.3 yr.		
Mean age	8.8 yr.			9.2 yr.			8.9 yr.		

children both before and during the present outbreak; and, because of their unusual concern and the limited movements of their children, were able to give unusually accurate information regarding their children's contacts. The apparent relative absence of the paralytic disease for at least ten years previously suggested that an increased number of susceptible persons might be present, thus creating extremely favorable conditions for dissemination of the virus in the community. This latter supposition, however, was subsequently believed to be in error, since no significant difference was present in median, mean and modal ages at onset in the groups, as is noted in Table 1. Apparently, although few clinical cases had been present, subclinical and asymptomatic infections had occurred to a degree not appreciably less than in the rest of the county during the previous ten-year period, resulting in a relatively equal latent immunization of the community.

A history of contact, in this series of cases, was recorded in those instances where a history of definite close association of an hour or more was obtained, such as a visit to a friend's home or play contacts of children. Casual contacts on the street or in stores were not recorded.

The type of contact was considered direct when the patient gave a history of contact with a person who had a definite case from 3 to 30 days prior to onset. Indirect contact was recorded when a history was obtained of close contact with another person (either well or with minor illness), who, in turn, had been in contact, from one to four weeks previously, with a person who had the disease. In no instances was contact considered through more than one intermediary.

The first case of poliomyelitis reported in Payson during 1951 was in a nine-year-old boy, with onset July 30. Three of his five siblings became ill, on July 31, August 3 and August 6, ages, 5, 10 and 7 years, respectively. All had typical clinical history and three of the four had findings consistent with bulbospinal poliomyelitis, the fourth with spinal paralytic disease.

A study of the home indicated that the premises were unusually dirty. The yard contained much rubbish and garbage, providing an ample breeding place for flies. The home had an open pit privy, allowing free access to flies. Several dogs and the neighbors' cow and pigs added to the odor and general uncleanliness of the area. The house itself was untidy, and the children showed evidence of much parental love but little soap and water. Several of the neighborhood children frequented this home.

The children in this home had had no definite contact with poliomyelitis as far as could be ascertained, with one exception. On July 23 a relative with her one-year-old child came to visit this family and stayed in the home for six days. Previously this infant had lived in an adjacent county, in a town where poliomyelitis was present. A few days before the visit she had become ill with fever, irritability and diarrhea, accompanied by pain when the legs were moved. The child remained ill during the visit and all the children in the home, as well as some of the neighborhood children, were in close contact with her during this period. Following the illness the infant was unable to stand, although she had been attempting to walk previously. Muscle evaluation on two occasions indicated that definite weakness of the right leg was present. Atrophy of the right quadriceps was noted on the final examination done four months following the illness. Although no spinal fluid was obtained during the illness, the diagnosis of poliomyelitis appears to be justified. It would seem that this child was the prob-

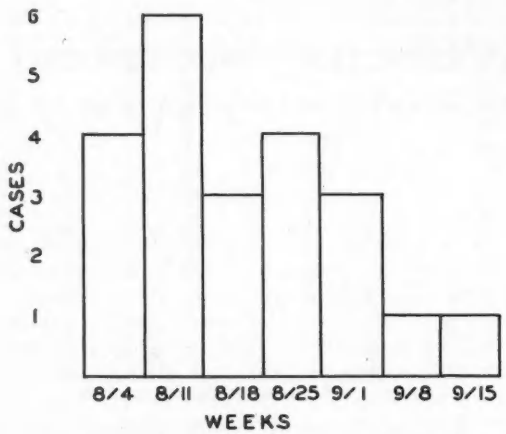

Chart 1.—Number of cases of poliomyelitis in Payson, Utah, by week of onset, in the period August 4 to September 15, 1951.

able source of infection for the initial cases reported from Payson.

The first case to occur in another family was that of a four-year-old boy in whom bulbospinal poliomyelitis developed August 4. Although this child had no known direct contact with members of the initial family, he lived nearby and one of his playmates had close contact within the home with both the initial family and the sick infant. This playmate remained well but may have become a healthy carrier through this contact with the virus.

The second case to develop in another family was that of a 26-year-old woman, with onset of spinal poliomyelitis August 5. Her only known contact with the virus, as far as could be determined, was a visit to another home in which the sick infant (previously referred to) was also visiting. The woman spent several hours in the home, and it is believed that her visit coincided with that of the infant and the infant's mother. An adult male member of the household in which the infant and its mother visited briefly, became ill, with headache and stiff neck, at about the same time that the 26-year-old visitor became sick. He was not examined by a physician during the acute episode and no muscle weakness was detected at a later date. Consequently, for the purpose of this study he was not regarded as having had poliomyelitis.

The next cases to develop were predominantly in children who had contact with the primary focus through an intermediary. One of these, that of a 20-month-old boy with onset of spinal poliomyelitis on August 22, was of particular interest. The patient lived on a farm about two miles from the center of town and, with two exceptions, had not been in contact with other children during the previous month. One of the exceptions was his three-year-old sibling,

TABLE 2.—*Contact history in 22 cases of poliomyelitis*

Case No.	Age (Year)	Sex	Onset Date 1951	Type of Paralysis*	Contact: Paralytic Case	Contact: Abortive or Suspect Carrier	Contact: Unknown
1	9	M	7-30	BSP	X	....	....
2	5	F	7-31	SP	X	....	....
3	10	M	8- 3	BSP	X	....	....
4	4	M	8- 4	BSP	....	X	....
5	26	F	8- 5	SP	X	X	....
6	4	M	8- 5	BSP	....	X	....
7	7	F	8- 6	BSP	X	....	....
8	6	F	8- 8	BSP	....	X	....
9	21	F	8-10	SP	....	X	....
10	5	F	8-11	SP	....	X	....
11	8	M	8-15	BSP	X	X	....
12	26	F	8-15	SP	....	....	X
13	6	M	8-18	BSP	....	X	....
14	1	M	8-22	SP	....	X	....
15	6	M	8-24	BSP	....	X	....
16	10	M	8-25	SP	X	....	....
17	5	M	8-25	BSP	....	....	X
18	7	F	8-28	BSP	....	X	....
19	7	M	8-29	BSP	X	X	....
20	4	F	9- 1	SP	....	....	X
21	11	F	9- 4	SP	X	....	....
22	4	F	9-13	SP	....	X	....
Totals					9	13	3

* Code: BSP = Bulbospinal poliomyelitis; SP = Spinal poliomyelitis.

who probably had abortive poliomyelitis about two weeks before, and the other was a two-year-old girl who lived near the home of the children with the initial cases and was one of the playmates of several of those children. This playmate was a frequent visitor, accompanying her father from town while he helped with the work on the farm. This child was not known to be ill at any time during this period. It is felt that this instance represents an infection brought to this home by the playmate and was manifest first as an abortive illness in the older sibling and later as a paralytic illness in the 20-month-old child.

Another example of rather obvious direct contact was the case of an 11-year-old girl with onset of spinal poliomyelitis on September 4. Her only known contact with the disease was about two weeks previously, at which time a woman who lived nearby, who was ill and had complaint of weakness of the right arm, helped her make cookies. Extension of definite spinal poliomyelitis developed in this woman during the next few days.

Of the remaining cases in this outbreak, the majority could be traced similarly, either directly or through a series of cases and not more than one suspect or abortive case or healthy carrier to the home into which the virus was presumably first introduced. The distribution and contacts are shown in Table 2 and Chart 1.

A total of 22 cases occurred in Payson, giving a rate of 553 per 100,000. There was a history of contact with the initially introduced case in four of these and a probable contact in one additional case.

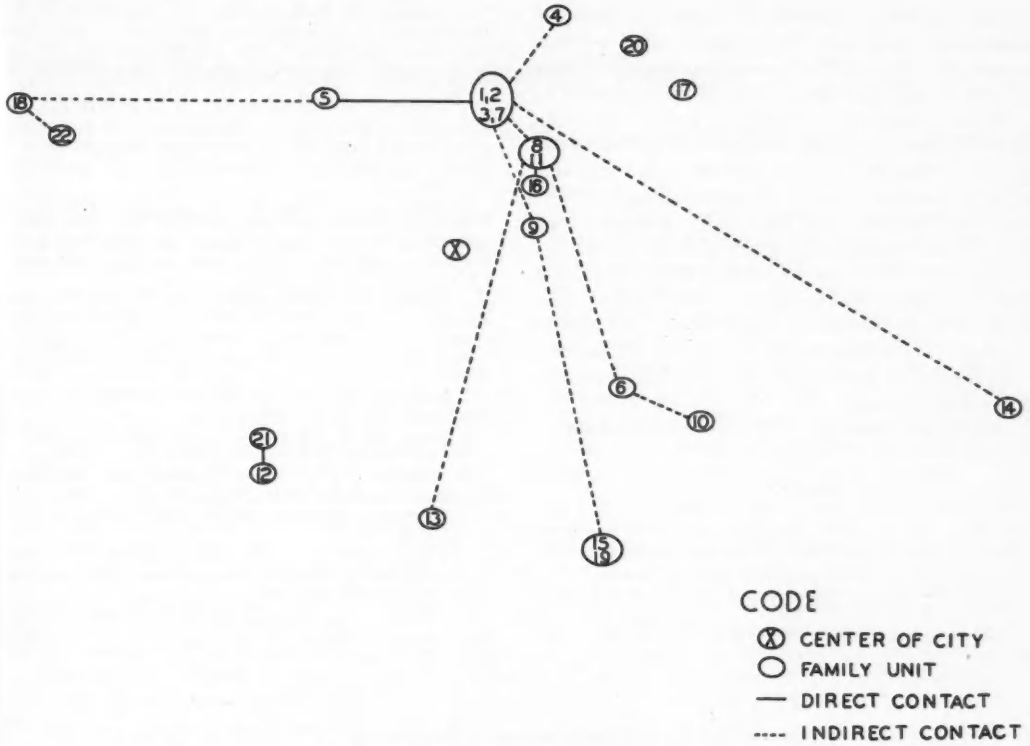

Chart 2.—Contact history of poliomyelitis epidemic in Payson, Utah, July 30 to September 13, 1951.

TABLE 3.—*Age distribution and type of involvement in 22 cases of poliomyelitis at Payson, Utah*

Age in Years	Bulbospinal	Spinal	Total
0-4	2	3	5
5-9	9	2	11
10-14	1	2	3
15-19	0	0	0
20+	0	3	3
Total	12	10	22

Thirteen additional cases appeared to have followed contact, through intermediaries with the family in which the first cases occurred. In three instances no definite contact could be ascertained, and the final case occurred following close contact, during the early paralytic stage, with one of these three cases of unknown origin.

In 12 cases there was bulbospinal involvement and in 10 cases spinal paralysis alone was manifest. There was no instance of bulbar involvement without spinal paralysis, and no nonparalytic cases were recognized. This pattern did not differ significantly from that in other parts of Utah County, where only 3.2 per cent of all cases showed only bulbar without spinal involvement. The age distribution of Payson cases is shown in Table 3. No deaths occurred.

Although the patients, with three exceptions, used city water (which was referred to previously), the curve of the outbreak (Chart 2) did not resemble that of a waterborne epidemic, nor did the radial spread throughout the town suggest this. The irrigation water was not believed to be a factor as it was not accessible to some of the patients, and as the occurrence of cases indicated that the spread was in the opposite direction from that of the flow of water. No common contact with the known contaminated lake was present, and although flies could have played a part in the dissemination of the disease, particularly during the early part of the outbreak, it would seem difficult to believe that the flies would fortuitously infect predominantly persons with a history of close direct or intermediate contact with patients with poliomyelitis.

With regard to the type of contact, the most frequently obtained history was that of close contact of children during play periods. In those patients having single contact, only two in number, the contact was close and of a duration exceeding one hour. In one instance the interval between contact and onset of disease was seven days and in the other 14 days.

It is emphasized that all of the patients had contacts other than those traced back to the original source; and, through the parents, contacts with other towns as well. However, it would seem difficult to explain this sequence of cases by means other than that of direct personal contact with either early cases or contacts of early cases. It is felt that this experience again confirms the work of Casey,[12] Perkins[10] and earlier investigators who emphasized the importance of personal contact in the epidemiology of poliomyelitis. However, it should be noted that this unusual success in contact tracing was not possible in other portions of Utah County[8, 12] nor in the Iowa-Nebraska portion of the study.[13] The Payson community appeared to be unusually favorable for contact tracing.

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Gamma Globulin for the Prophylaxis of Poliomyelitis

WITH THE END of the National Distribution Program of Gamma Globulin as of December 31, 1954, the limited supply of this material remaining in California was turned over by the Federal Office of Defense Mobilization to the State Health Officer for use as he saw fit.

The State Ad Hoc Advisory Committee on Prophylaxis of Poliomyelitis in its meeting January 21, 1955, recommended that the unexpended supply of gamma globulin now on hand be released to physicians through local health departments for the same use as last year with emphasis on the extremely limited value of its use for poliomyelitis prophylaxis. The current status of usefulness of gamma gobulin for this purpose may be concisely summed up as follows: "The protective capacity is controversial, the conditions for its use undefined, and the theoretical indications difficult to meet: Of no practical value."*

*"The Control of Communicable Diseases in Man," an official report of the American Public Health Association, eighth edition, 1955, page 137.

Physical Medicine for Injured Hands

S. MALVERN DORINSON, M.D., San Francisco

• The functional concepts of treatment of the injured hand by use of the various modalities of physical medicine, including heat, massage, electrical stimulation, passive exercises, active exercises, occupational therapy and splints are discussed. Immobilization is often necessary to correct anatomical injuries. Mobilization activities using physical medicine are just as necessary to correct functional deficiencies of the hand occurring either from the injury or the enforced immobilization following an injury.

INJURY TO THE HAND is one of the most disabling accidents than can happen to a worker. Industry pays more for hand disabilities than for those in any other part of the body and many companies pay more for them than for injuries in all other parts of the body combined.[3]

Much medical attention has been focused on the proper treatment of such injuries, but most of the emphasis has been put upon the anatomical aspects of treatment. This means adequate examination of the skin, good circulation, good bone alignment, intact tendons and normal skin sensation. The hand is then immobilized so as not to jeopardize any of these anatomical components of skin, circulation, tendons, bones and nerves. However, as Bunnell[2] has frequently pointed out, "hands are peculiar in that they are prone to become stiffened."

After anatomical healing of the injured part has taken place the immobilization apparatus is removed and usually there is stiffness present. This stiffness has several components: Edema involving all soft tissue structures and particularly the joint capsules; some shortening of joint capsules and of other soft tissues; stiffness of disuse in the muscles, particularly the intrinsic muscles of the hand, which therefore do not function correctly in moving the fingers; and pain, which is a factor in limiting active motion of the joints, particularly during the first few weeks.

All these factors are best and most quickly eased by the various means of physical medicine if they are properly used. Physical medicine includes the use of light, heat, water, electricity, massage, manipulation, exercise and mechanical devices in the treatment of disease. It is most commonly divided into two sections—physical therapy and occupational therapy.

Heat. The purpose of giving heat is twofold. First, it brings about vasodilatation, and with the increase of circulation comes improvement in the metabolism of the hand and removal of tissue metabolites. Second, the heat acts to anesthetize the endings of the nerves that transmit pain and thereby makes possible a greater voluntary effort.

There are many ways to apply heat to various parts of the body, but some of them are not suitable for the hand. For example, infra red is commonly used on the larger joints of the body but is not effective for use on the hand. The efficacy of infra red depends upon absorption by the skin surfaces. Since infra red is beamed on the skin from only one direction, only those surfaces in direct line with the rays are heated. As the hand has relatively large skin surface, only part of the member would be heated.

Diathermy can also be applied to the hand. However, diathermy has its effect mainly through the soft tissues and particularly the vascular tissues, and since there is not much tissue of that kind in the hand, diathermy is not a very effective method for use there.

Hot packs of woolen material soaked with hot water and thoroughly wrung out can also be used for the hand. However, the skin over an injured hand which has been immobilized is usually quite sensitive and will not tolerate hot packs well. Furthermore, there is the usual criticism of hot packs that the heat is not constant; the degree of heat is high at first and then there is gradual cooling. The paraffin glove method is another way to apply heat. The "gloves" are made by rapidly dipping the hand into barely melted paraffin six or seven times in succession until the hand is well coated. After this the hand is wrapped in some insulating material, such as a blanket, and the wrapping is kept on for about 20 minutes. This is a very good way of heating the hand, although it requires that the patient's fingers be immobile while the heat is applied.

The most efficient method of heating the hand is the whirlpool bath. This consists of immersing the hand for 10 to 15 minutes in rapidly whirling water maintained at a temperature of approximately 105°. Besides the effect of heat, there is the added advantage that, with relief of some of the pain by

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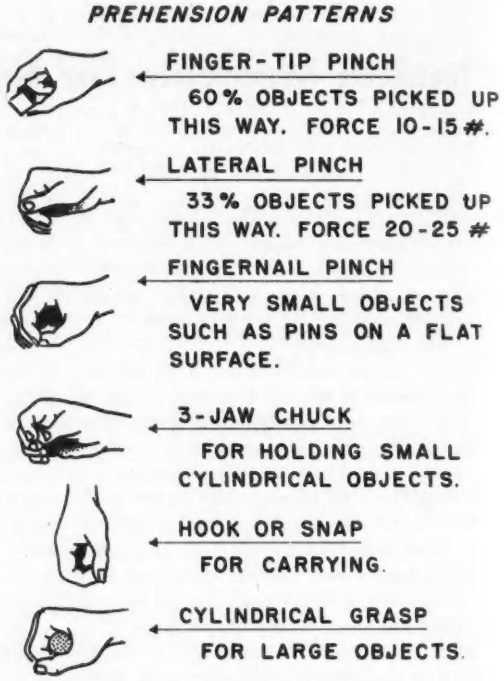
the whirling water, the patient can do active exercises in the water by squeezing a sponge or rubber bulb. This treatment should be given daily if possible. Ordinary hot soaks should not be used by the patient at home unless he has been carefully instructed and can be trusted to do active exercise while soaking.

Massage in treatment of the hands has only two purposes. First, edema can actually be massaged out of the hand. Second, by stretching the tight skin, elasticity can be restored and skin circulation can be improved.

Electrical stimulation is valuable if used judiciously. In the first few days after removal of the hand from a cast, when the muscles, particularly the intrinsic muscles, are quite stiff from inactivity, electrical stimulation with galvanic current (or faradic current if the nerve supply is intact) will start contractions of the muscles. The appearance of the hand, particularly its color, often is greatly improved after five minutes of such muscle stimulation. The enforced contractions of the intrinsic muscles greatly stimulate the deep circulation of the hand. Unless paralysis is present, it is usually not necessary to give stimulation more than a week. When the nerve supply has been temporarily interrupted, electrical stimulation is extremely valuable in maintaining elasticity and contractility of the muscles while the nerve supply is regenerating. The type of electrical current to use is that which will give a maximum contraction with a tolerable strength of current.

Passive exercises are useful if done intelligently and with an understanding of what is to be accomplished. Stretching, or even manipulation, might be included within the definition of passive exercise. Although the terms are anathema to many surgeons, in order to mobilize the phalangeal joints it is often necessary to stretch the collateral ligaments. This is done by stretching the joints laterally and also by attempting to rotate one joint on the other. The finger is then grasped just above the joint to be loosened and pulled in the same direction as the bone. While it is being pulled, it is then gradually eased into flexion at the joint being worked upon. This has to be done gently and without extreme force; otherwise harm can occur to the joint capsule as in any other forceful manipulation. If done judiciously, it will improve flexion. Each interphalangeal joint is worked upon individually and also the metacarpophalangeal joint.

Active exercises. This is the major and most effective part of the treatment. The previously described measures are adjunctive or preliminary to it. Active exercises will do more toward improving the circulation, removing edema, stretching out soft tissues and improving muscle strength than any other procedure.


PREHENSION PATTERNS
FINGER-TIP PINCH
60% OBJECTS PICKED UP THIS WAY. FORCE 10-15#.
LATERAL PINCH
33% OBJECTS PICKED UP THIS WAY. FORCE 20-25 #
FINGERNAIL PINCH
VERY SMALL OBJECTS SUCH AS PINS ON A FLAT SURFACE.
3-JAW CHUCK
FOR HOLDING SMALL CYLINDRICAL OBJECTS.
HOOK OR SNAP
FOR CARRYING.
CYLINDRICAL GRASP
FOR LARGE OBJECTS.

To function as an all-purpose grasping organ, the hand uses several prehension patterns (Figure 1) for specialized tasks. The most commonly used is finger-tip pinch. A force of ten to 15 pounds can be exerted normally in this fashion for picking up a majority of objects. Lateral pinch is the next most frequently used grip and a normal force of 20 to 25 pounds can be obtained with it. Fingernail pinch is used for very small objects such as pins on a flat surface. The "three-jawed chuck" is formed by the thumb against the index and middle fingers for handling small cylindrical objects. The hook is used for carrying heavy loads, with the thumb acting as the snap or spring to lock the hook. Cylindrical grasp is used for gripping large objects.

All these functions should be worked upon with a definite exercise routine. Telling the patient to squeeze a rubber ball is a mistake for the balls are usually so large and firm that they cannot be squeezed down even by a normal hand. It is much better to have him use a rubber sponge or bulb that can be crushed or pinched in various ways.

The patient must also be taught the proper way for opening and closing the hand in order to gain maximum excursion and to loosen tight structures. Closing the hand involves full flexion, first of the distal interphalangeal joint then the proximal interphalangeal joint and finally the metacarpophalangeal joint. Opening the hand should be done in the reverse fashion. Patients who have painful hands usually close the hand by flexing at the metacarp

joints first before attempting to flex at the interphalangeal joints. This causes them to use their intrinsic muscles to extend the distal phalanges and therefore makes it almost impossible for the long flexor tendons to flex the distal phalanges by which the fingertips touch the palm and close the hand.

Another point commonly overlooked in active exercise of the hand is the proper use of the thumb. The thumb almost always needs strengthening, particularly of the opponens and abductor muscles. Exercise must be directed to the intrinsic muscles of the hand, since they have been almost completely immobilized and have lost much of their power. Strengthening exercises must be given the muscles of the forearm, particularly the long flexors and extensors of the wrist and fingers. Various devices in the form of spring handles and bulbs of varying resistance, as well as weights and pulleys, are used to gradually increase the difficulty of the exercise. An excellent exercise to improve finger motion and grip is to make a "newspaper ball": A page of newspaper is laid flat and the patient gradually rolls it into a ball starting at one corner and continuing to wrinkle it into the palm without ever releasing it.

Occupational therapy is a much neglected aspect of physical medicine, particularly with regard to hand injuries, where it can help most. Occupational therapy has to be prescribed as precisely as physical therapy. The joint to be mobilized and the muscle to be strengthened should be given occupational tasks requiring repeated motions and continuous use of those joints and muscles. Occupational exercises are much less boring to the patients than are those carried out only for the sake of restoration, for the hand is used in a functional way rather than just to limber a joint or strengthen a muscle. There are special occupational therapy procedures for hands which include use of various types of tools whose handles have been increased according to the limitations of the grip. There are other types of activities such as woodworking, sanding, finger painting, clay modeling and belt tying. Unfortunately, too often patients and physicians misinterpret the purpose of occupational therapy, thinking it merely a recreational task without any functional purpose. If at all possible, patients should be given occupational tasks for improvement of function of the hand.

Splints. Frequently contractures occur in the hand after injury. It will do little good to carry out physical therapy if no effort is made to maintain corrections in the intervals between treatments. Good results depend upon appreciation of the inherently dynamic function of the hand as opposed to the essentially static nature of the usual kind of splinting.[1] The best splinting exerts continuous traction against the contracted structure yet does not immobilize the hand. Splinting of this kind was described by Bunnell,[2] who used various arrangements of rubber bands to exert traction at almost any joint of the hand. Such splinting is functional splinting, and as it serves to improve mobilization, treatment is being carried on constantly. This kind of splinting is probably one of the most neglected phases of physical treatment of the injured hand.

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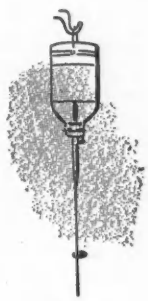

Office Management of Allergic Children

MORTON ZALL, M.D., Los Angeles

• There is a high incidence of allergic disease in average pediatric practice. Proper diagnosis and treatment can and should be carried out by a higher percentage of practitioners. A thorough history is the most reliable diagnostic method. Skin testing is quite often a very necessary diagnostic tool. Following testing, desensitization may be necessary. The technical details of these procedures should be common medical knowledge. Where desensitization is necessary and is properly carried out, the results are definitely better than with mere symptomatic management.

CHILDREN DIFFER so much from adults that a line can be drawn between adult allergic disease and that of childhood.[6] There are special problems in pediatrics which complicate the allergic picture, and certainly pediatricians are much better trained to cope with them than are adult allergists.

At the School of Medicine, University of California at Los Angeles, especial attention is being given to instruction as to management of allergic disease in children. This phase of pediatrics has only lately been delineated clearly in the pediatric textbooks, and even here it is not presented in a format that makes it easy to put into practice. Until recently, there were very few medical schools that gave any time specifically to pediatric allergy. Considering the high incidence of allergic disease in average pediatric practice, it is regrettable that this field is still being neglected in most medical schools.

At U.C.L.A., an effort has been made to so simplify the methods of diagnosis and treatment of allergic disease that they will not seem to students impossible to use in ordinary practice. We begin by giving basic didactic lectures and then quickly go into the actual practical procedures that are necessary in office practice. We stress the importance of careful history-taking in each case, since the history is the most reliable single factor for detecting the antigen that is causing an allergic manifestation.[4, 9] It is emphasized that at least an hour should be set aside for the initial history, and this should be supplemented with follow-up questioning from time to time. Skin testing is given its proper perspective so that the students recognize that it is merely another laboratory procedure like fluoroscopy or electrocardiography. We invariably do scratch tests first, and find that this suffices in many cases. However, it is often necessary to do intradermal testing also. At the 1953 annual meeting of the American Academy of Pediatrics, the Allergy Section devoted an entire panel session to office management of allergic diseases in children. It was amazing to see the enormous differences in the attitudes of the discussants with regard to skin testing. Ratner of New York City said he tested with about 500 materials, many of them intradermally, whereas Deamer of San Francisco said he used between 20 and 80 materials, all of them by the scratch method, and seldom found intradermal tests necessary. The "average" opinion was that about 80 to 120 representative tests were sufficient, and that intradermal tests are often necessary but need not be done to as great an extent as scratch tests.

At U.C.L.A. we have a standard list of 80 tests (see accompanying form). The first group of tests covers the important pollens in the Los Angeles area.[5, 7, 8] The first three tests cover the important trees, the next nine the grasses and the remainder the weeds. Following this is a group of tests for foods in the various categories; and finally there are tests for epidermal materials that are important as inhalant allergens. The inadequacies of the food tests are explained to the students but at the same time it is shown how important the inhalant tests are. Since the patients are dealt with in a clinic, we do all of these tests routinely.

All testing solutions, trays, treatment materials and paraphernalia of all types are obtained from commercial suppliers, for that is the source from which the student will get his supplies when he starts practice. We try to remove as much of the mystery from the subject as possible, lest the student throw up his hands at facing an impossible task. The Pirquet borer is easily obtained, so we use that for the scratch tests.[3] We show that this work is not completely out of the field of the pediatrician or general practitioner, either from the standpoint of the physical setup or the amount of knowledge required. After the preliminary didactic work and basic instruction the students at U.C.L.A. then actually participate in the work of the clinic. They take histories and do physical examinations; then, under close

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From the Department of Pediatrics, University of California at Los Angeles.

TRAY 1	Sc	Id	Sc	Id
1. Juglans californica—California Black Walnut (3-4)				
2. Olea europa—Olive (4-5)				
3. Quercus agrifolia—Coast Live Oak (3-4)				
4. Bromus rigidus—Broncho (4-5)				
5. Cynodon dactylon—Bermuda (3-10)				
6. Distichilis spicata—Salt grass (3-6)				
7. Elymus condensatus—Giant rye (5-8)				
8. Holcus halepensis—Johnson (6-8)				
9. Lolium multiflorum—Italian rye (3-5)				
10. Lolium perenne—Perennial rye (4-8)				
11. Poa annua—Annual June (1-5)				
12. Poa pratensis—Kentucky Blue (4-8)				
13. Amaranthus retroflexus—Redroot Pigweed (7-10)				
14. Chenopodium album—Lambs Quarters (4-8)				
15. Ambrosia psilostachya—Western Ragweed (8-10)				
16. Artemisia californica—Coast Sage (7-12)				
17. Artemisia vulgaris het.—Mugwort (7-10)				
18. Franseria acanthicarpa—False Ragweed (8-10)				
19. Atriplex lentiformis—Lenscale (7-9)				
20. Salsola kali—Russian Thistle (5-10)				

TRAY 3	Sc	Id	Sc	Id
1. Carrot				
2. Celery				
3. Lettuce				
4. Onion				
5. Green Peas				
6. String Beans				
7. White Potato				
8. Tomato				
9. Cocoa				
10. Cocoanut				
11. Peanut				
12. English Walnut				
13. Beef				
14. Chicken				
15. Lamb				
16. Pork				
17. Rabbit				
18. Turkey				
19. Cottonseed*				
20. Pyrethrum				

TRAY 2	Sc	Id	Sc	Id
1. Barley				
2. Corn				
3. Oat				
4. Rice				
5. Rye				
6. Halibut				
7. Salmon				
8. Shrimp				
9. Prune				
10. Grapefruit				
11. Banana				
12. Grape				
13. Olive				
14. Orange				
15. Peach				
16. Pineapple				
17. Apple				
18. Apricot				
19. Soy Bean				
20. Cabbage				

TRAY 4	Sc	Id	Sc	Id
1. Cow's Milk Casein				
2. Cow's Milk Lactalbumin				
3. Goat's Milk				
4. Egg White				
5. Wheat				
6. Mixed Feathers				
7. Cat Hair				
8. Cattle Hair				
9. Dog Hair				
10. Horse Hair				
11. Rabbit Hair				
12. Wool				
13. Goat Hair				
14. Kapok				
15. Orris Root				
16. Tobacco				
17. Silk				
18. House Dust				
19. Alternaria				
20. Hormodendrum				

*Cottonseed will not be tested intradermally.

EVALUATION OF SKIN REACTION

☐ Erythema 1+ 2+ 3+ 4+ ☐ Wheal A B C D

Diagram of Reaction:

Form used at U.C.L.A. School of Medicine Pediatric Allergy Clinic for recording results of tests with allergens. The numbers in parenthesis after the names of the plants indicate the months of peak pollenization.

supervision, they take a hand at the testing, participate in the general management and give some of the treatment injections. They are taught a small amount of basic botany and are made to understand the differences, as to allergenic factors, in the various areas of the country.

Since one of the most important things to be done in dealing with a child with allergic disease is to determine how far to carry diagnosis and treatment, an effort is made to impress students with the importance of assessing the severity of each case. The simplest cases require very little time and very little treatment, whereas intensive investigation and exhaustive therapy is necessary in severe cases. This is the one thing the students cannot learn, as it comes only with increasing experience. If the case is severe enough to require testing, the values as well as the limitations of the tests are explained to the parents, who usually have to be convinced. Here again, confidence and experience are necessary. It is helpful to demonstrate on the parent's forearm just how the scratches are made and usually they are surprised at the relative simplicity. The author does the scratch tests on the child's back and intradermal tests on the upper arm. The scratches are usually done 40 at a time and then 50 per cent glycerine extracts[3] are applied in the order shown on the chart. To keep a small child immobile, one of the parents holds the child over his shoulder and a nurse holds the child's arms around the parent's neck while the parent holds the trunk and legs. The scratches can be made in a few seconds and the extracts are applied in amounts so small they will not run. The extracts for scratch tests come in small dropper type bottles. Usually if it is necessary to do intradermal tests after the scratch tests, the parents are amenable. The author believes that it is very important, at least during the first years of practice, for the physician to do all of the testing himself, unless he is blessed with an unusually competent nurse who has had excellent training in allergy. Certainly the reading and interpretation of the tests must be done by the physician. (At the previously mentioned panel discussion, the question of who should do the testing provoked a great deal of discussion, Glaser arguing that the nurse should do all or most of the testing, Deamer that it was incumbent upon the physician to do it.) Children show flaring or erythema much oftener than whealing and there is no such thing as standard sized flares and wheals.[1] Each child is a rule unto himself and the degree of reaction is a relative thing for that individual child. The "negative" reactions are the controls, and the "positive" reactions are graded downward relatively from the strongest. In our clinic a diagram is drawn on the test sheet showing the approximate size of the largest reactions for future reference.

Completing the skin tests should not be the signal for invariably plunging the patient into a long course of treatment. (During the previously mentioned panel discussion, Ratner, who stretches an extremely long series of tests over a period of three to five months, said that he frequently had good therapeutic results merely from the testing procedure alone.) In determining the need for hyposensitization, the question of the relative severity of the case again arises. It is often necessary to observe the patient for several weeks to several months before deciding on the correct course of action. The author does not insist beforehand that where desensitization is necessary it must be carried out over such-and-such a period of time; this may be embarrassing if the allergic manifestation clears rapidly, for the parents then may be skeptical of the need for "superfluous" injections. (The consensus of the members of the panel was that if such treatment is necessary it is usually required over a period varying from one and a half to five years, and that if it is adequately carried out, good results are obtained in as high as 85 per cent of cases.) It is always wise for a physician to visualize for the parents the expected fluctuations in the clinical manifestations and to train them to notify him or to visit the office as the symptoms demand. Generally the author gives one injection a week, but for the more severe cases and for flare-up, two or more may be necessary. The best rapport is developed where the physician gives as many of the injections as he can and talks to the parents each time they come in. Certainly if the child is having trouble the physician should always discuss it with the parents and not leave it to a nurse.

The stock antigens which we use in treatment at the U.C.L.A. clinic are as follows:

1. Spring (grass): Cynodon dactylon, Lolium multiflorum, Poa annua.

2. Fall (weed): Ambrosia psilostachia, Franseria acanthicarpa, Artemesia californica, Artemesia vulgaris heterophyllis, Salsola kali.

3. Trees: Juglans calif., Olea europa, Quercus agrifola.

4. Dust stock as prepared by the Efron method.

5. Alternaria and Hormodendrum.

6. Feather mixture.

Because of the great amount of cross-antigenicity among the pollens of the large sub-groups, it is felt that these stocks can be used successfully for treat-

nent in most cases. Occasionally, however, individual specific antigens are necessary.

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Protection for the Points of Hypodermic Needles

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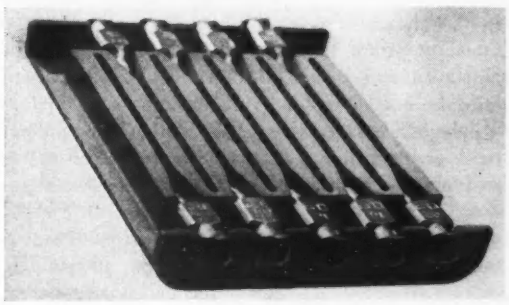
BLUNTING OF THE POINT of a hypodermic needle often occurs during sterilization when the point comes in contact with the metal wall of the sterilizing tray.

The device shown in the photograph is a protective holder, with slots and notches to hold nine hypodermic needles of various sizes. Only 3 inches by 2½ inches, it fits into even a small sterilizing unit and yet leaves space for several syringes besides. Made of a plastic material that may be boiled or subjected to high temperatures in an autoclave without warping, it will last for at least a year under ordinary use. Besides protecting the points, the



holder provides a place where needles may be kept in orderly arrangement by size, and from which they may be easily removed for use.

Submitted November 15, 1954.

1904 Franklin Street, Oakland 12.

Abdominal Incisions for Operations on the Colon and Rectum

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• *The magnitude of extirpative operations of the colon and rectum, advanced by improved supportive measures, may be increased by decreasing the extent of transverse abdominal incisions.*

The right colon can be removed with facility through a transverse incision across the left upper abdomen.

A left upper transverse incision, plus either an oblique or a Cherney incision, is preferable to a long vertical incision.

DURING THE PAST TWO DECADES there has been a gradual but progressive shift from multiple-stage procedures to one-stage operations for extirpation of the colon and rectum. Such progress is not attributable to greater surgical skill, but is a result of the rapid advance in the knowledge and management of shock, fluid balance, chemical homeostasis, nitrogen balance, intestinal decompression, anesthesia and, to a lesser extent, chemotherapy and the antibiotics.

When confronted with the task of removing the colon, or the colon and rectum, surgical judgment in the choice of operative procedure may be the most important factor in the achievement of low mortality and decreased morbidity. Each patient must be considered individually and many factors weighed. The age and general condition, the pulmonary and cardiac status and the estimated native resistance must be balanced against such considerations as the gravity of the disease and the risk of anesthetizing and operating two or three times as opposed to once. In considering the physiologic aspects of surgical trauma,[4] the bodily changes in surgical convalescence,[5] and the metabolic effects of anesthesia,[3] one must conclude that a one-stage operation is the procedure of choice. Only when the life of the patient would be unduly jeopardized by a one-stage operation should the procedure be carried out in two or more stages.

Since the colon winds its way around the periphery of the peritoneal cavity, or at least seeks out the corners thereof, a major consideration in one-stage extirpative operations is the choice of the abdominal incision, or incisions. Mobilization of the splenic flexure of the colon necessitates an incision fairly high in the left upper quadrant of the abdomen. Anastomosis to the terminal sigmoid colon or upper rectum, and abdominoperineal proctectomy require an incision extending to the pubis. The surgeon must choose between single or multiple incisions. A single vertical incision from the costal margin to the pubis will provide adequate exposure for total colectomy. Such an incision is justifiable in operating on patients injured in war, particularly in hospitals close to the combat line, for usually the exploration of the entire peritoneal cavity is necessary, and speed is vital, since the patient often is bleeding and in shock. This is not the incision of choice, however, in the performance of elective operations.

The argument dealing with the relative merits of vertical and transverse incisions has been treated amply in the literature and will not be discussed in detail here except to emphasize that the transverse abdominal incision provides the following advantages:

1. Less postoperative pain
   a. Decreased postoperative shock
   b. Less sedation
2. Less sedation
   a. Decreased incidence of nausea
   b. More rapid return of normal peristalsis
   c. Earlier oral feeding
   d. Relatively unimpaired cough reflex
3. Deeper respiration, and more frequent turning in bed
   a. Decreased incidence of pulmonary complications
4. Earlier ambulation
   a. More rapid convalescence
5. Decreased tension on wound edges
   a. Retention sutures not required
   b. Primary union
6. Decreased incidence of dehiscence
7. Decreased incidence of incisional hernia.

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The opinions or assertions contained herein are the private ones of the writer and are not to be construed as official or reflecting the views of the Navy Department or the Naval Service at large.

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Submitted November 3, 1954.

Unprejudiced reflection, physiologic consideration and time will eventually prove the advantages of the transverse abdominal incision. The powerful muscles of the abdomen are the oblique and transverse muscles. They not only initiate the act of turning in bed, but are the main propulsive force of turning. A normal person turns in bed many times each night, and after operation a patient should turn even more often. Why, then, should a vertical incision across the line of this preponderant muscular pull be made?

The "mystery" of the continued widespread use of the vertical abdominal incision is not at all mysterious. It is used by a majority of the leading surgeons of today because they used it in their youth, and are loath to change. Furthermore, most prominent surgeons of today neither make nor suture the abdominal incision—their assistants do. In the past, a surgeon who made a long transverse abdominal incision would have been accused of a lack of knowledge of anatomy. In the future, the routine use of the vertical abdominal incision can only be explained by a lack of appreciation of the function of the abdominal musculature.

Because the colon traverses the margins of both the right and left sides of the peritoneal cavity, it would appear that an incision across the entire abdomen would be required for total colectomy. Such is not the case. The colon lying in the right side of the cavity may be removed with ease through a transverse incision across the left upper quadrant of the abdomen. Obviously, such an incision would not be employed unless the transverse colon and splenic flexure were to be extirpated.

After division of the gastrocolic omentum, the middle colic artery and vein are divided and ligated at their base. With the transverse colon held in the left hand, the surgeon can push slightly opened scissors around the lateral margin of the hepatic flexure and ascending colon, dividing the peritoneum with facility. Thereupon, the entire right colon and terminal ileum are delivered through the left upper quadrant incision, and the left colic and ileocolic vessels may be clamped and divided at their base in full view. The technical ease is due to the fact that the operator is merely "unwinding" the embryologic rotation of the colon. The left transverse incision adequately exposes the midline origin of the arteries concerned and, in fact, encourages a more thorough resection of the mesentery. Suffice it to say that the surgeon who removes a colon through this incision for the first time will be amazed by the ease of the delivery of the right colon.

The pelvis cannot be adequately exposed by a transverse incision. However, an oblique incision (as advocated by Waugh[8]) provides satisfactory exposure for operation on the sigmoid colon and rectum, and it has the advantages of the transverse incision, as it parallels the nerve supply and is almost in line with the major muscular pull. This incision extends from a point superior and medial to the left anterior superior iliac spine to the right of the center of the symphysis pubis. The left rectus muscle is transected as in the case of transverse incisions.

The Cherney incision[1] is excellent, particularly when maximum exposure is desirable in operations on the rectum or sigmoid colon in obese patients or in infants. A curved incision is made 2 cm. above the symphysis pubis. The anterior rectus sheaths and the aponeuroses of the external abdominal oblique muscles are divided in line with the incision. The tendinous insertions of the rectus abdominus muscles are divided flush with the superior surface of the symphysis pubis, and the peritoneum is divided in line with the incision. The incision is below the panniculus of fat in the obese, an obvious advantage. In closing this incision the tendinous terminations of the rectus muscles are sutured to the anterior rectus sheaths with interrupted mattress sutures of cotton or silk, immediately superior to the symphysis pubis.

A modified or "half-Cherney" incision provides adequate exposure for the majority of operations on the sigmoid colon and rectum. This is made and sutured in the same manner as the Cherney incision, except that it is not extended to the right, and the tendinous insertion of only the left rectus abdominus muscle is divided.

The Cherney incision, while providing the greatest exposure, has two disadvantages. It takes 15 to 20 extra minutes to make and suture the incision. In the presence of massive pelvic contamination, when wound infection is anticipated, this incision should not be used, for if it should break open as a result of infection, there is not enough tissue below the incision to permit the placement of through-and-through sutures for secondary closure of the dehiscence.

The oblique and the Cherney incisions possess the physiologic advantages of the transverse incision, and either one is preferable to a vertical incision. Actually, only the lower half of a vertical incision provides exposure of the lower pelvis, whereas the full length of the oblique or Cherney incision is utilized for exposure.

Incisions for ileostomy or permanent colostomy deserve consideration. The incision for ileostomy should be made by a muscle-splitting technique either through or lateral to the right rectus muscle. A button of skin should be excised to eliminate the V-shaped gap that results on either side of the stoma if a straight incision is used, and also to lessen the risk of stenosis. Likewise, either a button of the an-

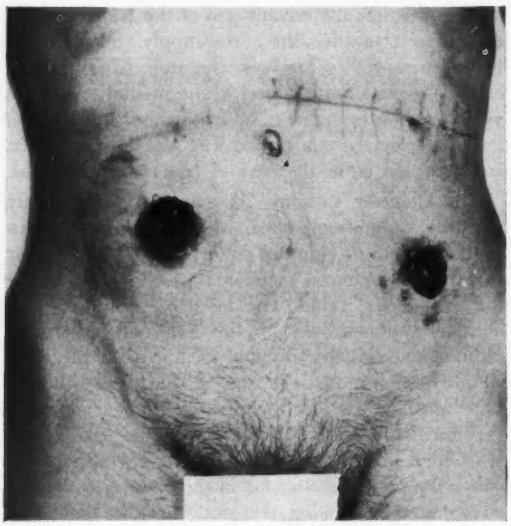

Figure 1.—Left transverse incision—in this case for total colectomy except sigmoid colon.

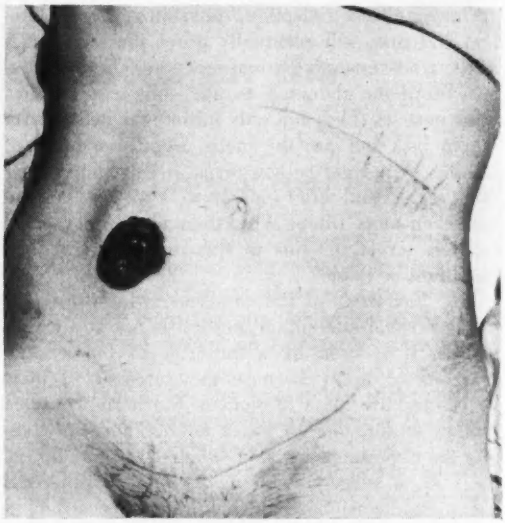

Figure 2.—Left upper transverse incision and "half Cherney" incision—here used for total colectomy and abdominoperineal proctectomy.

terior rectus sheath, or of the aponeurosis of the external abdominal oblique should be excised. Crile and Turnbull,[2, 7] have made an outstanding contribution to the surgical management of ileostomy, calling attention to the fact that serositis of the projecting portion of the uncovered ileum always occurs, resulting in contiguous peritonitis of the intraperitoneal terminal ileum, mesenteric lymphadenitis, segmental adynamic ileus and obstruction. They noted that the ileostomy does not function properly until the mucosa has everted, has covered the serosa of the projecting ileum and has become attached to the skin—a process requiring approximately six weeks. Hence they advocated immediate "surgical maturation" of the ileostomy. To do this, the ileum is delivered two inches beyond the skin and is held in place by a suture through its terminal mesentery, the peritoneum and the posterior rectus sheath. The external layers of the terminal inch of ileum are excised, leaving only the mucosa. This mucosa is everted over the remaining projecting inch of ileum and sutured to the skin around the periphery of the stoma. A temporary ileostomy bag is immediately applied. Important details of the application and subsequent management of the ileostomy bag have been described by Turnbull.[7] The author has utilized this procedure in two instances since the presentation of the paper by Crile and Turnbull,[2] and the results have been gratifying.

The technique of creating a single-barrel colostomy following abdominoperineal proctectomy differs in two ways from that used in an ileostomy. Since a permanent colostomy bag is not used, projection of the colon beyond the skin is not necessary or desirable; and since muscular control of the stoma is desirable, it should be made through a muscle-splitting incision lateral to the rectus sheath. Buttons of skin are excised from the skin and the aponeurosis of the external abdominal oblique. The colon should be sutured to the skin around the circumference of the stoma with numerous closely placed interrupted sutures of fine catgut. This procedure, to quote Smyth,[6] "violates most of the principles of colon surgery—but it works." Actually, it fulfills the very important surgical principle of no

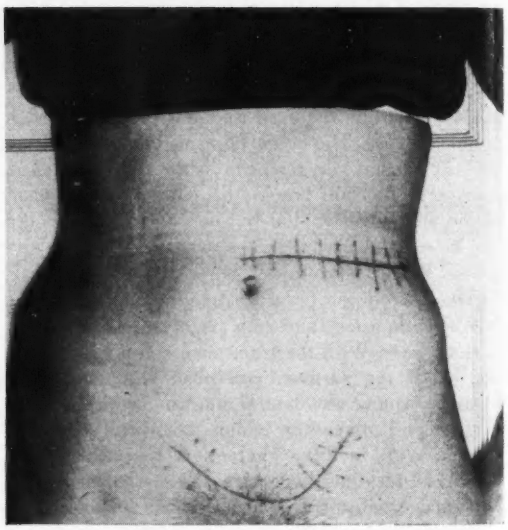

Figure 3.—Left upper transverse and Cherney incisions for total colectomy and ileoproctectomy.

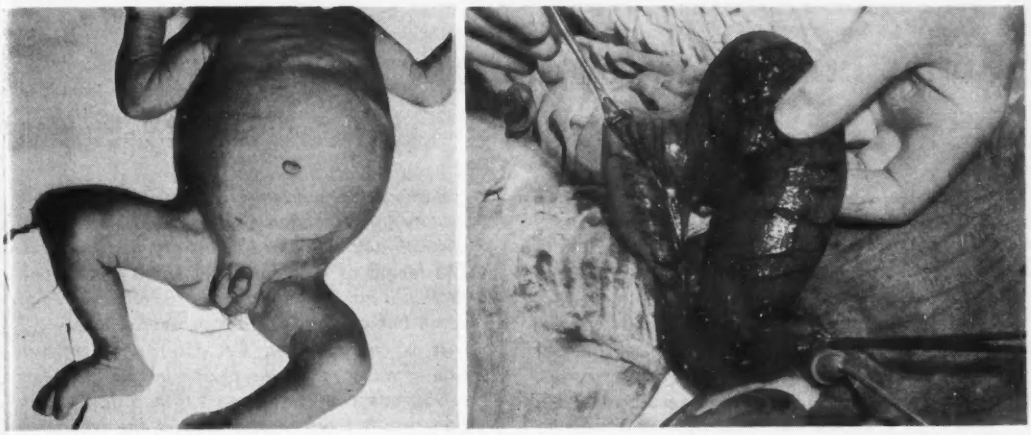

Figure 4.—Use of Cherney incision in abdominoperineal correction of congenital recto-urethral fistula and megasigmoid. Good exposure was obtained despite greatly enlarged sigmoid colon.

permitting naked serosa to project beyond the skin. The author has used this technique in nine instances since receiving advice from Smyth, and the resulting colostomies have been the best that he has ever achieved. The colon is pulled through the abdominal wall in the usual manner with a Payr clamp, and isolated. The oblique or Cherney incision should be sutured and completely isolated from the colostomy, preferably by rubber dam and cement. The colon, held with no tension, is divided at the level of the skin and sutured to the skin. This procedure provides a colostomy that does not retract, prolapse, or stenose.

The following abdominal incisions for operations on the colon and rectum are recommeded:

1. Right transverse incision, one centimeter above umbilicus.
   Right colectomy.
2. Left transverse incision, two to five centimeters above umbilicus.
   Left colectomy.
   Transverse colectomy.
   Total colectomy, except sigmoid colon (Figure 1).
3. Left upper transverse incision, plus either an oblique or a Cherney incision (modified to "half Cherney" incision in thin patients).
   Total colectomy and abdominoperineal proctectomy (Figure 2).
   Total colectomy and ileoproctostomy (Figure 3).
4. Oblique incision, or a Cherney incision.
   Abdominoperineal proctectomy (Figure 4).
5. Button excision of skin and aponeurosis of external abdominal oblique, with muscle-splitting of internal oblique and transverse abdominus muscles (or muscle-splitting of rectus abdominus when indicated for proper fitting of ileostomy bag).
   Ileostomy (Figures 1 and 2).
   Colostomy.
   Mucous fistula (Figure 1).

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Studies in Traumatic Amnesia

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• *Retrograde amnesia is for a period of time, usually for a fraction of a minute in simple concussion, and not loss of memory for an event. The length of time for which there is no recollection is not directly related to the duration of coma but can be for days or even weeks.*

It is characterized by inability of restoration of memory for the period in question. Any retrograde amnesia of more than a day's duration results from trauma only if the trauma is severe enough to cause prolonged coma, usually weeks. It should be under suspicion of being due pathologically to more than concussion. Careful attention should be given to the possibility of hysteria or malingering as a factor.

THERE ARE BASICALLY two kinds of amnesia. One is due to destruction of retentive patterns of memory for a category of things, as occurs in alexia, due to destruction of the major angular gyrus. In this condition the engram patterns representing the memory are destroyed so there is nothing to recall; the patient cannot even read, and he must learn all over by building new patterns in the other angular gyrus. The other basic type is amnesia of recall, in which the basic patterns are not destroyed but contact with them is lost.

In cerebral concussion, without contusion or laceration, the memory loss is of the second variety. The engram patterns are not destroyed but the patient finds it difficult to find the past events in his memory patterns. He loses memory for a period of time. In contusion or laceration there may be absolute loss of a category of memories (as in the first type) if the lesion occurs in a specific area of cortex. Thus *temporal amnesia* occurs in concussion, in senile dementia and in the fugue states of epilepsy, and *categorical amnesia* in agnosia and in hysteria. Following cerebral concussion there may be amnesia for a period of time before the injury—*retrograde amnesia.* There may also be amnesia for events subsequent to awakening from coma—*anterograde amnesia*—but the latter period is complicated by difficulty in making observations; interest and attention may be difficult or lacking due to the general mental state resulting from the blow.

Retrograde amnesia following cerebral concussion and, of course, following more severe cerebral damage, is routine. After simple concussion with unconsciousness for a fraction of a minute, the amnesia is usually for about half a minute to a minute before the blow. It is common for a man struck while crossing a street to have no recollection of leaving the curb. Often he will say something such as: "I saw a lot of cars coming. The last I remember is standing on the curb deciding to cross."

How does retrograde amnesia come about? It is not difficult to conceive of new memory patterns being disrupted when they have not had time to establish associations. It is, however, difficult to understand how a man can have retrograde amnesia of a whole day or of a week as the result of a blow on the head. It would seem, *a priori*, that such memories have had time to be ingrained and should still be present, although perhaps hard to recall.

Everything one sees, everything one perceives, ordinarily leaves a memory pattern, an engram, which is the anatomical and physiological basis of retentive memory as distinguished from memory of recall. That basic engram will remain for life unless it is anatomically destroyed. And unless it actually is destroyed as by hemorrhage, softening or neoplasm, the memory pattern is there to be recalled, if not voluntarily, at least by hypnosis or by some other technique.

Memory of events occurring during the period for which a patient has retrograde amnesia following a blow to the head is difficult, if not impossible, to restore. It is acknowledged that the memory patterns have not been destroyed by hemorrhage, thrombosis or embolism when no abnormality is noted upon neurological examination, but associations have been broken. The amnesia that is caused by simple concussion, therefore, is amnesia of recall and not gross destruction of memory patterns.

In general, the longer the period of traumatic coma the longer the period of retrograde amnesia. Yet the period of retrograde amnesia does not vary directly with the period of coma; it is usually much shorter than the coma. In simple concussion, retrograde amnesia for a period of more than five minutes is unusual. Ordinarily, retrograde amnesia of an hour would be associated with coma of a full day, and retrograde amnesia of more than a week would be related to several months of coma.

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Presented before the Section on Psychiatry and Neurology at the 83rd Annual Session of the California Medical Association, Los Angeles, May 9-13, 1954.

If long periods of retrograde amnesia—a day or more—are claimed, hysteria or malingering should be suspected; careful study should be made of the possibility of serious complication of the trauma, such as hemorrhage into the brain stem.

Reports of three illustrative cases follow:

CASE 1: A man aged 40 years was involved in an automobile accident and was unconscious five weeks in spite of good care, with tracheotomy and even exploration for subdural hemorrhage, which was not present. After regaining consciousness he was disoriented for two weeks. He then had aphasia and right homonymous hemianopia. The patient recovered from aphasia but not from hemianopia. Upon examination 11 months after the accident it was noted that the right pupil did not react to light and the left pupil reacted sluggishly. The remaining cranial nerves were normal. Thus there must have been a vascular lesion in the mesencephalon secondary to the trauma. The sixth thoracic vertebra and one wrist had been fractured. Babinski's sign was evoked on both sides.

The patient had retrograde amnesia of 20 hours. Even when his activity of the previous day was related to him he could not recall even setting out on a trip the day before the accident. His memory was poor in general, especially for dates and names, and he could not think as well as formerly. Still his recall of his past life until the day before the accident was good. Retrograde amnesia of about 20 hours was therefore accepted as a fact.

CASE 2: A man 43 years of age was unconscious for three weeks after injury in a collision.

Fourteen months after the injury he still had retrograde amnesia of three months. He could not recall having moved into a new house or having done anything else in that period. He said that memory for his entire life was hazy and his wife was constantly filling in gaps for him. Alteration of personality was noted in him. He was completely apathetic about his family, home and work. He said he just did not feel like working and he spent his time sitting about the house or at the beach. He still had assumed no responsibility for the expenses of living or even in helping his wife about the house.

The blood pressure, pulse rate, all reflexes of the body and the cranial nerves, including those serving the fundi and pupils, were completely normal. There were no complaints of dizziness or headache.

With a mental state of complete apathy, it is admittedly difficult to determine any loss of memory for the remote past. The patient would make no effort to recall and he answered vaguely all questions about current events. However, there was no question about retrograde amnesia of three months.

CASE 3: A man 33 years of age when observed was still disabled two years after injury in an automobile accident. The records in the case showed coma for four months after the injury, but the patient said he had been comatose for five months. He also claimed anterograde amnesia of seven months in addition to retrograde amnesia of twelve years. Because of these claims, a personality study was made. It was found that he had left school at the age of 14 years to work on a farm. At the age of 17, he began to work at copper mining and supported his mother and two younger siblings because his father, a chronic alcoholic, had left home. After 18 months of mining he became an apprentice painter and learned the trade. He moved about a great deal. Born in Arkansas, he lived in several cities until he moved to Arizona for a sojourn of several years in a number of different cities, then moved back to Arkansas. There he married. When he entered the armed forces he left his wife and child in Arkansas. It soon developed that he related happenings within the 12-year period for which he claimed amnesia. When this was pointed out to him, he said that when he heard part of a story he could recall the rest. He was separated from the service.

He left his wife and obtained a divorce on grounds of adultery in Arkansas in 1945, and then came to California. He married again in 1947. When he attempted to reenlist he was refused because his wife had tuberculosis. He obtained a divorce. When he was again separated from the service, he tried to remarry his second wife but she refused. He continued to fill in details of the 12-year period because it was after these events that his accident occurred. From this it was concluded that he forgot whatever it was convenient to forget and that the amnesia should not be called retrograde. Neither was it hysterical, for he readily accepted all facts given him and was completely unemotional about them. His pragmatic approach to reality is also shown by his divorcing his first wife and forgetting about her, his divorcing his second wife to enable him to enlist, and his return to her later. As he believed that a long period of amnesia would give him greater compensation than a short one, there was an element of malingering in the case.

Since the degree of retrograde amnesia is fairly proportional to the duration of coma following a blow to the head, and since retrograde amnesia may actually cover many days after weeks of coma, it must be assumed that, other things being equal, the newest memories with the fewest associations are more vulnerable than old ones. It is easily understood that memories with strong emotional value are more resistant to destruction than others. Retrograde amnesia, due simply to concussion, is therefore much like the amnesia of senile dementia or of senility in being purely temporal in character. Amnesia due to traumatic hemorrhage is like that of thrombosis, embolism or cerebral compression on a focal spot—it is categorical; a category of memories is lost. Hysterical amnesia is both temporal and categorical. The amnesias of agnosia and aphasia are purely categorical. Temporal amnesia is due to interference with association patterns and hence is amnesia of recall. The memory patterns are still present and need only to be evoked.

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Amyloidosis in Paraplegia

Correlation with Decubitus Ulcers

A. ESTIN COMARR, M.D., Long Beach

• Six patients died with amyloidosis and four patients are living with amyloidosis out of 1,000 with spinal cord injuries who were studied.

No correlation was found between Congo red retention and the length of time since injury or the site of the spinal cord lesion. However, it is felt that the longer decubitus ulcer persists, the greater is the probability of amyloidosis.

It is believed that decubitus ulcers with secondary osteomyelitis are of primary importance as etiologic factors in amyloidosis associated with spinal cord injuries, and that pyelonephritis plays a very minor secondary role.

THE OCCURRENCE of amyloid disease in patients with chronic spinal cord injury has received little mention in the literature, only three articles on the subject having appeared to date.[1, 5, 10] A total of 16 deaths due to amyloidosis occurring in patients with spinal cord injury or disease was recorded in these articles, and no correlation between the site of the spinal cord involvement and fatal outcome was noted.

The present study was undertaken in order to determine: (1) The number of deaths due to or associated with amyloidosis which occurred on the Paraplegia Service of the Veterans Administration Hospital at Long Beach, and (2) the clinical incidence of amyloidosis on the wards and the relationship of amyloidosis to the spinal level of injury and to the time interval since injury. The Congo red test was used to determine whether or not amyloidosis was present in the living patients.

Reports in the literature classify amyloidosis found in paraplegia as secondary amyloidosis.[1,5,7,10]

A review of the records of deaths at this center disclosed that amyloidosis as determined by Congo red test or necropsy was present in six of 73 deaths among 1,000 patients. Brief reports of those cases follow:

CASE 1. The patient, 25 years of age, died 57 months after injury. The level of injury was at the seventh thoracic segment and it was clinically a "complete" lesion. A Congo red test had not been done. The patient had hydronephrosis and multiple decubitus ulcers. Necropsy showed death from uremia caused by acute and chronic pyelonephritis, and decubitus ulcers of the sacrum, ischial areas and heels associated with osteomyelitis beneath the ulcers. Amyloidosis of the kidney, liver, adrenal glands, pancreas and spleen was present, as it was in cases observed by Reingold.[6]

CASE 2. The patient, aged 37 years, died 46 months after injury. The level of injury, clinically complete, was at the second thoracic segment. The Congo red test showed amyloidosis prior to death. The patient had decubitus ulcers and chronic pyelonephritis. Necropsy showed death from uremia caused by chronic pyelonephritis with renal calculi. There were decubitus ulcers of the sacrum, heels and left trochanter, and osteomyelitis beneath the ulcers. Amyloidosis was found in the spleen, liver and kidneys.

CASE 3. The patient, 43 years of age, died 212 months after injury. The lesion, at the twelfth thoracic segment, was clinically complete. The Congo red test had not been done. The patient had a chronic trochanteric decubitus ulcer. He died of uremia secondary to obstruction from an invasive squamous cell carcinoma of the bladder (the only case of bladder cancer noted among 1,000 patients). Necropsy verified the clinical diagnosis of chronic pyelonephritis, hydronephrosis and multiple decubitus ulcers. Amyloidosis was found in the kidneys, liver, adrenal glands and spleen.

CASE 4. The patient, 28 years of age, died 115 months after the onset of paraplegia, which was caused by meningitis. The level of the lesion was at the fourth thoracic segment and it was clinically complete. The patient had multiple and deep decubitus ulcers of long duration which persisted despite repeated attempts at closure. He also had chronic pyelonephritis. A Congo red test showed the presence of amyloidosis prior to transfer of the patient to a hospital closer to his home. Necropsy at the second hospital showed amyloidosis.

CASE 5. The patient, aged 21 years, died 114 months after injury. The lesion was at the tenth thoracic segment and was clinically complete. The patient had multiple decubitus ulcers of long duration. Some time after successful ischialectomy on the right, a fistula developed between the operative site and the urethra. The Congo red test showed the presence of amyloidosis two months before death.

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Submitted June 15, 1954.

Hepatomegaly and splenomegaly were noted clinically. The family refused permission for necropsy.

CASE 6. The patient, 24 years of age, died 35 months after injury, which was at the third thoracic segment and was clinically complete. The patient had a history of decubitus ulcers. Amyloidosis was verified at necropsy.

THE CONGO RED TEST ON WARD PATIENTS

The Congo red test was performed on 102 patients who were taken more or less at random but with an attempt to include patients with injuries of long standing and those who had genitourinary tract disease and/or decubitus ulcers. There were no untoward reactions following the injections. Congo red solution (Breon) was used and urine specimens were collected and examined in order to exclude urinary loss of dye.

In patients in whom no clinical evidence of amyloidosis was present, the retention of dye varied from 1 per cent to 43 per cent; in a group of 16 patients in whom amyloidosis was suspected, only four retained over 90 per cent of the dye.*

No correlation was found between Congo red retention and the length of time since injury or level of spinal cord lesion.

DISCUSSION

Amyloidosis of the kidneys, spleen, liver and adrenal glands was noted at necropsy in the present series. Involvement of these organs is in keeping with reports in the literature.[6] Pancreatic involvement was observed in one case. Amyloidosis of the intestinal tract, which Talbot[9] described and reported as causing death by starvation in a case of spinal cord injury, was not observed in the present series. The shortest time interval between injury and death with amyloidosis was reported to be 11 months.[1] The longest period of record, observed in the present series, was 212 months.

At the Paraplegia Center in Richmond, Virginia, 83 of 657 patients admitted died, and amyloidosis was present in eight of those who died.[4] In the material in the present study there were six deaths with amyloidosis among 73 fatalities and 1,000 admissions. Amyloidosis may have been present in some additional cases in which the patient died but necropsy was not done.

It is surprising that so few of the patients on the wards suspected of having amyloidosis had significant retention of the dye. All the patients in this group had pathological changes of the genitourinary tract and/or severe, long-standing decubitus ulcers. The period since injury varied from 26 to 134 months. One patient with chronically draining osteomyelitis of the spine and decubitus ulcers so severe as to require bilateral exarticulations at the hip joints, had dye retention of only 37 per cent 43 months after injury.

The period since injury in the four cases in which retention was above 90 per cent varied from 42 to 107 months. All four patients had had severe persistent decubitus ulcers since injury. One who had 90 per cent retention of the dye had a fistula between the urethra and the site of ischialectomy, like the patient in Case 5 who died. All of them excreted protein in the urine, in which globulin could be demonstrated.

As there were six patients who died with amyloidosis and four patients on the wards who had more than 90 per cent retention of Congo red solution, there were, in all, ten of 1,000 patients who were found to have amyloidosis.

The author agrees with observers who consider the triad of urinary infection, chronic osteomyelitis and decubitus ulcer as the cause of secondary amyloidosis in cases of spinal cord injury.[10] The author also agrees that it is unjustified to attribute the development of amyloidosis in spinal cord injury to pyelonephritis alone, since amyloidosis was not noted in large series of necropsies in cases of non-spinal cord lesions with chronic pyelonephritis.[5] Three amyloidotic patients, examined postmortem at this station, died of uremia, whereas in three others who also died of uremia there was no evidence of amyloidosis on necropsy.[6] In other words, if pyelonephritis is the most prominent cause of amyloidosis, as proposed by one observer,[1] why were not signs of amyloidosis observed at necropsy in all six cases? In a previous study of renal changes in paraplegia as noted in routine intravenous urography,[2] it was found that pathologic changes ranging from mild to severe were present in nearly 27 per cent of the 630 kidneys studied. Yet a diagnosis of amyloidosis was not made in any case in the group. It is, therefore, the author's impression that the chief cause of amyloidosis in patients with spinal cord injury is decubitus ulcer with its accompanying bone involvement, and that pyelonephritis plays a secondary role.

The personalities of the six deceased patients with amyloidosis and those of the four who are still alive showed, with one exception, autistic tendencies from the onset of their disability, and the ensuing behaviorism could be characterized as leading to "physiological suicide."[8] The exception was the patient who died from carcinoma of the bladder; he had no abnormal psychological pattern.

Although regression of amyloidosis has been reported,[3] the most important consideration is the

*In appraising results of the Congo red test in the present series, retention of 90 per cent or more of the amount given, after elapse of one hour, was considered indicative of amyloidosis.

prevention of amyloid formation by proper prophylactic measures. Decubitus ulcers can be prevented by adequate early nursing care and by keeping the patient's general and nutritional status at an optimum.

V. A. Hospital, Long Beach 4.

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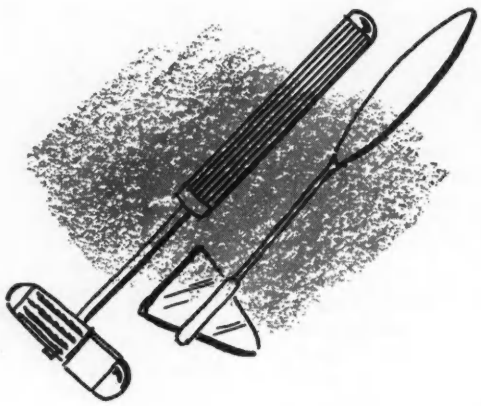


WHAT'S YOUR *Diagnosis?*

CLINICAL-PATHOLOGICAL CONFERENCES

Polk Hall, Civic Auditorium, San Francisco
Monday, May 2, at 2:00 p.m.
DWIGHT L. WILBUR, M.D., San Francisco, *Moderator*

CASE 1

Clinicians: **Theodore E. Woodward, M.D., Baltimore, and Arthur L. Bloomfield, M.D., San Francisco.**
Consulting Radiologist: **L. Henry Garland, M.D., San Francisco.**
Pathologist: **Warren L. Bostick, M.D., San Francisco.**

In April 1954, a 39-year-old, white businessman entered the hospital on the seventh day of an acute febrile illness which had begun with malaise, sore throat, and an elevation of oral temperature to approximately 102° F. He also complained of nausea, vomiting, hiccuping, and epistaxis. He had developed a cough which was productive of blood-streaked sputum and had noticed frequent loose stools of normal color. The patient was hospitalized when it was discovered that the sclera of his eyes were of a slight yellow tint.

PAST HISTORY

In 1940 the patient had an acute, tender enlargement of the right epididymis of two weeks duration, followed by residual swelling. The acute swelling, with redness and tenderness, had recurred one week before his admission to the hospital. There was no history of excessive intake of alcohol or of known hepatotoxins.

PHYSICAL EXAMINATION

Temperature, 101° F., pulse 96, respirations 30, blood pressure 130/70 mm. of mercury.

Examination on entry to the hospital revealed an acutely ill patient in obvious respiratory distress. He was severely dehydrated and somewhat confused.

Head. The conjunctivas were conspicuously injected, and the sclerae moderately icteric. The nose contained a small amount of dried blood. The pharynx was intensely injected, and there was an inspissated exudate on the posterior wall. There was no rigidity of the neck.

Thorax. On percussion, the heart was not enlarged, and no murmurs or arrhythmias were detected. On examination of the chest, scattered areas of subcrepitant rales and bronchial breathing were heard.

Abdomen. A blunt hepatic margin, not tender, was felt 7 cm. below the right costal margin. The spleen was not palpable. The scrotal skin was red and indurated; the right testis was enlarged, measuring 3 x 4 x 4 cm.; most of the swelling was in the posterior-superior pole.

Rectal. Examination showed no abnormalities.

Extremities. The deep tendon reflexes were bilaterally hyperactive, and ankle clonus was present.

Laboratory. Hemoglobin 14.5 gm. per 100 cc. Leukocytes 5,000 per cu. mm. The differential count showed 41 per cent lymphocytes; some were large atypical forms and had fenestrated nuclei. The urine was amber and cloudy and contained 2+ alb. and a few leukocytes. The icterus index was 28 units; cephalin flocculation, 1+, serum alb. 2.1 gm./100 ml.; serum glob. 2.3 gm. per 100 ml. The albumin-globulin ratio was 0.9. Pharyngeal smears showed a small number of Gram-negative rods and a few Gram-positive cocci. The prothrombin concentration was 40 per cent. Agglutinations were negative in all dilutions for heterophile antibodies, typhoid, paratyphoid A and B, brucellosis and tularemia. A coccidioidin skin test was negative. Culture of the blood revealed no growth during a 14-day period.

X-Ray Examination. Roentgenograms of the chest were interpreted as showing a central pneumonia of the upper lobe of the right lung and severe bronchitis at the base of both lungs.

HOSPITAL COURSE

The clinical course was unfavorable and was marked by complete disorientation, generalized mild clonus and positive extensor plantar responses. The patient developed frank hematemesis, increasing epistaxis, and the icterus increased. Examination of the cerebrospinal fluid at this time showed it to be normal. The sputum became thick and brownish and, when cultured, yielded a heavy growth of Monilia. No discrete areas of pulmonary consolidation developed, but scattered fine rales persisted. Periumbilical ecchymosis appeared and became progressively more severe. The abdomen became distended. Three subsequent agglutination tests for leptospirosis icterohemorrhagica and leptospirosis canicola, however, were negative. The complement fixation reaction with Q-fever antigen was negative. The leukocyte count rose from 5,000 per cu. mm. at the time of admission to 22,000 per cu. mm. shortly

before death, and a persistent lymphocytosis was noted throughout hospitalization.

The patient became progressively worse and developed evidence of renal insufficiency. The nonprotein nitrogen of the blood was 80 mg. per 100 ml., and the urea nitrogen was 30 mg. per 100 ml. Loss of blood, which was evidenced by bright red blood from the rectum and dark, tarry stools, was replaced by transfusions. Despite treatment, including the administration of aureomycin, penicillin, streptomycin in doses of 0.25 gm. every four hours during the last four days of his illness, and lipotropic substances, the patient became stuporous on the fifteenth day of illness and died.

* * *

CASE 2

Clinicians: **Claude E. Welch, M.D., Boston, and F. Avery Jones, M.D., London.**

Consulting Radiologist: **L. Henry Garland, M.D., San Francisco.**

Pathologist: **Sidney C. Madden, M.D., Los Angeles.**

The patient was a 63-year-old Italian male tailor. The chief complaints were hunger pains in the stomach for three years, worse for the past two months. The patient noted weakness on standing up.

PRESENT ILLNESS

About three years ago a mild burning in the epigastrium began to appear about three hours after meals. It was relieved by taking milk and food but not by soda. Although this distress had increased during the preceding two months, even at the time of observation the pain was mild. However, about two weeks before observation nausea and vomiting of undigested food began to occur 10 minutes after meals. No coffee grounds material had been seen. An x-ray study of the stomach two weeks before admission was said to be normal. During the past week stools were tarry. The patient said he was weak upon standing up. Three days before admittance the patient coughed up a small blood clot "probably from the back of the throat." A weight loss of 10 pounds during the past two months was reported.

PAST HISTORY

There was no history of gastrointestinal bleeding, operations or alcoholism. The patient had taken three straight shots of gin for pain one week before admission. No soreness of the tongue, diarrhea, constipation, jaundice, thoracic pain, night sweats or swelling of ankles had been noted. The patient smoked one to two packs of cigarettes daily plus a pipe and Italian cigars. A non-productive cough had been present for three months. At age 16 the patient had shifting joint pains and stayed three months in a hospital. He had had no known heart trouble then or since. There was no history of neurological abnormalities.

PHYSICAL EXAMINATION

The temperature was 98.6 degrees F., the pulse rate 90, the respiration 28, and the blood pressure 140 over 70 mm. of mercury. The patient was pale, and he appeared to be well developed, well nourished and not in acute distress. No spider angiomata, icterus or lymph node enlargement was noted. The tongue was coated. The lungs were clear. There were no abnormalities in the size or the sounds of the heart. Mild tenderness was noted in the right epigastrium. Upon rectal examination, tarry fecal matter was observed. The prostate was normal. No neurological abnormalities were observed.

Laboratory. On admission the hemoglobin was 9.1 gm. per 100 cc. of blood. There were 2,840,000 erythrocytes per cu. mm. and leukocytes numbered 13,200 per cu. mm.—6 per cent stab cells, 54 per cent segmented cells and 40 per cent lymphocytes. Nucleated erythrocytes were present. Pronounced hypochromia was noted. Platelets were adequate. The urine contained 3 to 5 leukocytes per high power field.

HOSPITAL COURSE

Transfusion of whole blood was started three hours after admission; despite a mild reaction 1500 ml. was given. Hemoglobin was not raised significantly at first, but by the end of the second day after admission and after another 2000 ml. of blood the hemoglobin content reached 12.6 gm. per 100 cc.

On the third day in the hospital a slightly tender mass was felt in the right epigastrium, possibly in the liver, about two fingerbreadths down. The blood pressure, which fell during the transfusion reaction to 100 over 60 mm. of mercury, stabilized there. The body temperature rose slowly to 102.8 degrees F. during the first two days and there was accompanying cough. Right lower lobe dullness and rales at both lung bases were noted on the third day and penicillin was given intramuscularly, 600,000 units twice a day. A film of the chest taken with portable x-ray equipment on the fourth day showed pulmonary congestion and some right pleural effusion. The body temperature returned to normal on the sixth day. Cephalin flocculation was four plus, and the result of a thymol flocculation test was negative.

After the tarry stool on admission no evidence of bleeding was noted until bright blood appeared in the feces on the sixth day. Upon examination a prolapsed internal hemorrhoid was observed and the rectum was packed with cotton. The bleeding stopped. The hemoglobin content of the blood on the sixth day was 9.1 gm. per 100 cc. and an additional liter of whole blood was infused. The prothrombin time at this time was 54 per cent of normal. Vitamin K was given.

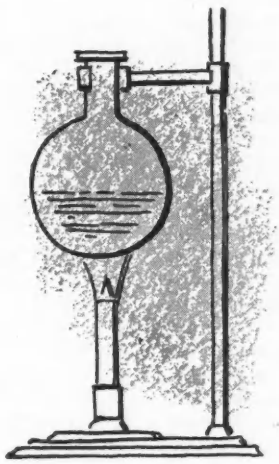
On the seventh day the patient had urinary burning. A catheter was inserted into the bladder and 1300 ml. of urine flowed out, clear except for bleeding near the close. Pyridium® and later Gantrisin® were given. Some bleeding through the catheter

continued during the next two days. A surgical consultant advised operation if active bleeding recurred.

On the tenth day the stools again were tarry. The hemoglobin content of the circulating blood was 5.8 gm. per 100 cc. After transfusion of five units of blood in the succeeding 24 hours the hemoglobin was 9.1 gm. Ecchymoses appeared about the sites of puncture for transfusion. Leukocytes at this time numbered 7,050 per cu. mm. of blood and the platelet content was slightly diminished. Prothrombin time was 88 per cent of normal. Bleeding time was five minutes and clotting time eight minutes.

From the eleventh to the sixteenth day an average of one liter of blood daily was given and the hemoglobin was maintained between 8 and 10 gm. per 100 cc. An upper gastrointestinal series by the Hampton technique revealed no gastric or duodenal lesion although there was a suggestion of an incisura of the duodenal cap. The bleeding time and clotting time remained elevated and the plasma fibrinogen was found to be 150 mg. per 100 cc. and the serum bilirubin 1.2 mg. per 100 cc. Metamyelocytes were observed in a smear and the number of nucleated erythrocytes increased. Blood continued to appear in the urine and in the stools.

On the seventeenth day while transfusions were continuing the patient became lethargic, then comatose. The lungs appeared clear. The blood pressure was 180 over 80 mm. of mercury. Babinski and Hoffman signs and sustained ankle clonus were present on both sides. Superficial reflexes were absent. The pupils were equal in size and in reaction to light. The pulse rate increased to 150 per minute. The patient vomited a large amount of dark blood and died three hours later.



CASE REPORTS

Paroxysmal Nocturnal Hemoglobinuria

A Report of Two Cases

JULIUS BAUER, M.D., and
EUGENE H. HEIDENREICH, M.D., Los Angeles

PAROXYSMAL NOCTURNAL HEMOGLOBINURIA (PNH), also known as Marchiafava-Micheli's disease, is not a common disease. (Crosby,[1] in an excellent review, noted only 162 case reports published up to July 1953). It is, however, a disease of great general biologic interest, since it represents a unique kind of intravascular blood destruction apparently not limited to red blood corpuscles, since an abnormality of renal function seems to be a prerequisite, and since all known factors responsible for precipitated hemolysis—toxic, infectious, immunologic, genetic—can be excluded from etiologic consideration.

It is the purpose of this communication to emphasize a practical side of interest. Paroxysmal nocturnal hemoglobinuria may readily be confused with spherocytic hemolytic icterus and, hence, treated by splenectomy which is useless and even risky in this condition. This is illustrated by the first of the two cases herein reported. The second case demonstrates the seemingly paradoxical but well known phenomenon of a combination of phlebothrombosis with increased hemolysis and the beneficial effect of dicoumarin treatment.

The term nocturnal hemoglobinuria is not quite correct because hemosiderinuria rather than hemoglobinuria is a constant feature of the disease, and sleep rather than night is the essential inciting factor. The retention of carbon dioxide in the blood due to diminished pulmonary ventilation during sleep causes the increased hemolysis. The erythrocytes are at fault and susceptible to the proteolytic effect of normal plasma enzymes, especially if the acidity of the plasma rises during sleep. Erythrocytes of patients with this acquired disease are rapidly destroyed if transfused to normal persons, whereas normal erythrocytes transfused into patients with this disease survive a normal length of time.

The abnormal hemolysis in PNH takes place within the circulating blood, as contrasted with the accelerated destruction of the red corpuscles by the reticulo-endothelial system in other types of hemolytic anemia; hence, the relatively mild elevation of serum bilirubin and fecal and urinary urobilinogen, and the chief elimination of the liberated hemoglobin through the kidneys. Some of the iron derived from hemoglobin is lodged as hemosiderin in the renal epithelia and excreted in the urine where it can readily be identified by its Prussian-blue reaction in the sediment. Whereas the threshold for renal excretion of free plasma hemoglobin in normal persons has been found to be about 130 mg. per 100 ml. of plasma, the threshold may be as low as 50 mg. per 100 ml. in cases of this disease. Hence, the abnormality encountered in paroxysmal nocturnal hemoglobinuria involves the renal tubules also.

The susceptibility of the erythrocytes of patients with PNH to be destroyed by the proteolytic enzymes of normal plasma is not due to an abnormality of hemoglobin[2] but probably to a defect of the stromal protein.[1] The similar susceptibility of leukocytes and platelets in PNH suggests a similar defect of these cells.[1]

CASE REPORTS

CASE 1. A 38-year-old Caucasian man, a bartender, was admitted to the Los Angeles County Hospital on May 5, 1953, because of complaint of bloody appearing urine of three days' duration. The patient had noticed weakness and fatigability since the age of 20 but did not seek medical aid until 1941 when, because of anemia and jaundice, he was hospitalized in another city. A diagnosis of congenital hemolytic icterus was made and splenectomy was done. A report on this episode, obtained from the records of the hospital, contained no conclusive evidence of the diagnosis. It included notations, however, that the icterus index was increased to 37-52 units, that the blood was hemolyzed and that cholecystography showed a normally functioning gallbladder. Congestion and an increased amount of hemosiderin deposit were noted in the removed spleen. Since the operation the patient had led an active life, having served in the merchant marine during the war. He was a heavy drinker. On two occasions, in different hospitals, he received a blood transfusion for anemia. Except for this he was doing well until December 1952, at which time emergency operation was done for a perforated ulcer. After recovering the patient again was asymptomatic until three days before the present admission when, fol-

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Submitted August 31, 1954.

lowing an attack of low back pain, he noticed what he took to be blood in the urine. The color persisted until the time of entry to the hospital but did not cause dysuria.

The patient was well nourished and well developed. Slight icterus of the skin and of the sclerae was noted. The blood pressure was 110/70 mm. of mercury. The temperature, pulse and respiration rate were normal. The heart was not enlarged and the lungs were clear. The abdomen was normal except for the scars of two previous surgical procedures.

The urine was coffee-colored with 2 plus reaction for protein. Granular casts were seen, but no red cells. There was a strongly positive reaction for hemoglobin. The hemoglobin content of the blood was 8.8 gm. per 100 cc. Erythrocytes numbered 2,400,000 per cu. mm., with 30 per cent of the cells reticulocytes and thrombocytes in normal number. Leukocytes numbered 9,500 per cu. mm., with segmented neutrophils 66 per cent, lymphocytes 25 per cent, monocytes 7 per cent, eosinophils 1 per cent and basophils 1 per cent. In addition, there was anisocytosis, leptocytosis and polychromasia and Howell-Jolly bodies were noted. Result of a serologic test was negative for syphilis. Direct and indirect Coomb's tests were negative for antibodies. The icteric index was 33 units, the erythrocyte fragility normal, and the bone marrow hyperplastic, showing chiefly erythroid hyperplasia. The patient had been instructed to save a sample of urine each time he voided, and it was noticed that the morning specimens were much darker in color than the afternoon specimens. The dark, morning specimens contained hemoglobin, the light amber afternoon specimens did not. The result of Ham's acid hemolysis test for paroxysmal nocturnal hemoglobinuria was positive on several occasions. The urine was also strongly positive for hemosiderin. It gave a negative reaction for urobilinogen in a dilution of 1:10. The stool, however, contained a moderately increased amount of urobilinogen—490 mg. average per 24 hours.

A transfusion of two units of washed erythrocytes was given and, following this, the patient went into remission. He was discharged with hemoglobin content 10 gm. per 100 cc. of blood, erythrocytes 3,300,000 per cu. mm. and leukocytes 10,100 per cu. mm., and remained well at least during the next monthly clinic visits.

As was pointed out previously, the renal threshold for excretion of free plasma hemoglobin is lowered in PNH. There was no evidence in the foregoing case of any other impairment of renal function. Because aminoaciduria is known to be a fine indicator of impaired tubular reabsorptive capacity in some cases, it was looked for in this case but was not found. White blood corpuscle and platelets were not affected by the disease.

Although there are a few cases on record of PNH in which the osmotic fragility of the red corpuscles was increased or spherocytosis was present, indicating a combination of spherocytic hemolytic jaundice with PNH,[1] no such findings could justify this diagnosis in the foregoing case. It is probable, therefore, that the patient had PNH from the onset and at the time splenectomy was carried out. It is important to realize that hemoglobinuria may be absent in the initial stage of the disease when only increased hemolysis and hemoglobinemia are found.

* * *

CASE 2. A 50-year-old Caucasian man was admitted to the Veterans Administration Hospital in Long Beach on January 27, 1953, because of pain and swelling of the left leg for approximately a month. The patient told of having intermittent episodes, over the previous five years, of dark urine in the morning. The condition lasted one to three days. There was also history of anemia, for which iron and vitamin B_{12} had been prescribed.

Upon physical examination the patient was noted to be pale and the sclerae slightly icteric. The blood pressure was 120/60 mm. of mercury, the pulse 80 and the temperature 100° F. The heart, lungs and abdomen were normal. A moderate edema of the legs was noted and there was slightly increased warmth, but no redness; tenderness was noted in the calf behind the knee and on the inner aspect of the thigh up to the groin on the left, and slight tenderness in the right calf.

There was hemoglobin in the urine. The number of leukocytes in the blood, determined daily, varied from 4,250 to 1,860 per cu. mm. Erythrocytes varied from 1,860,000 to 3,510,000 per cu. mm., with the proportion of reticulocytes ranging from 3.7 per cent to 10.5 per cent. Hemoglobin content varied between 7.7 gm. and 11.3 gm. per 100 cc.—the higher level having been reached after transfusion of 1,000 cc. of washed erythrocytes. A Donath-Landsteiner cold agglutinin test was negative. Bone marrow aspirate showed erythroid hyperplasia. Erythrocyte fragility was normal, and a Coomb's test negative for antibodies. There was negative reaction to a test for syphilis. The result of an acid hemolysis test for PNH was positive. Because thrombophlebitis was becoming more severe, the surgical staff advised and performed a ligation of the inferior vena cava. The patient then was given dicoumarin and improvement was noted from that point on. He was later discharged for outpatient care with a prescription of maintenance dosage of dicoumarin. Of interest to note is that the hemoglobin content, which was increased to 11.3 gm. per 100 cc. after the transfusion of washed red cells, remained at that level following the administration of dicoumarin.

Case 2 is remarkable for the combination of phlebothrombosis and beneficial effect of dicoumarin therapy in PNH. Almost 50 per cent of patients with PNH die of thromboses, chiefly abdominal or cerebral. Whether the thrombotic tendency is due to an abnormality of the readily agglutinating platelets[1] or to localized accumulation of erythrocyte stromas[3] is not certain. It is likewise uncertain whether the abdominal pain, headache or pain in the back or shoulder is due to small vascular thromboses[1] or to porphyria.[3]

The persistent leukopenia in Case 2 substantiates Crosby's opinion that leukocytes as well as erythrocytes are susceptible to premature destruction by proteolytic enzymes of normal plasma. As to the blood platelets, no morphologic abnormality was noted in the patient. There was no indication that crises of temporary bone marrow failure, with resulting increased anemia, leukopenia or pancytopenia, might have occurred in either of the two cases here reported. Such crises, however, are common in various types of genetically determined hemolytic diseases.

It stands to reason that treatment with cortisone or corticotropin (ACTH) and splenectomy in cases of PNH have no rational basis. Furthermore, it is important to know that whole blood transfusions may aggravate rather than improve the hemolysis by introduction of the donor's normal plasma which may be a hemolyzing factor for the patient's red corpuscles. Only carefully washed normal red cells deprived of admixture of plasma should be transfused.

For the exact diagnosis of this disease, two simple laboratory tests in addition to Ham's acid hemolysis test are available and should be used, particularly if no hemoglobinuria was observed at the time of examination: (1) Test for hemosiderinuria by adding ferric chloride to the urinary sediment; (2) Hegglin's diminished heat resistance test consisting of hemolysis if the blood of the patient is kept at a temperature of 37 degree C. for 6 to 24 hours.

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Healed Dissecting Aneurysm of the Aorta

PAUL J. SANAZARO, M.D., San Francisco

ACCURATE DIAGNOSIS of acute dissecting aneurysm of the aorta has become commonplace, owing to increased awareness of the variable clinical syndrome. A continuing challenge is the recognition of so-called healed dissecting aneurysm, which, because of the presence of aortic systolic and/or diastolic murmurs, may mimic syphilitic aortic aneurysm or chronic rheumatic heart disease. Healing occurs in 13 to 27 per cent of all instances of dissecting aneurysms[2, 10] and results from reentry of the false channel into the aortic lumen at some point distal to the site of initial intimal rupture. There is thus no further extension, and patients may survive for long periods without symptoms, ultimately dying of congestive heart failure, rupture of the aorta or cerebral hemorrhage.

CASE REPORT

The following case illustrates the characteristic history and cardinal signs of healed dissection of the thoracic aorta.

A 60-year-old white man was admitted to hospital in May, 1954, because of recurrent paroxysmal nocturnal dyspnea of five months' duration. The illness had begun in September, 1949, with sudden, excruciating mid-back pain which radiated straight through to the epigastrium and lower sternal area. The patient said he felt extremely weak at that time but he remembered no sweating, dizziness, headache, cough, dyspnea or weakness of limbs. There were no gastrointestinal or genitourinary complaints. Medication (type not known) gave no relief from the persistent pain, which spead upward to the interscapular area and both shoulders and then slowly subsided in 13 days. The patient was not hospitalized, and no data are available regarding the cardiovascular status at that time. After that episode he was asymptomatic, except for a lifelong tendency to frequent respiratory infections, until January, 1954, when paroxysmal nocturnal dyspnea developed. The attacks occurred weekly, lasted 20 minutes to an hour and were associated with wheezing, productive cough and a sense of epigastric fullness. The patient said he had not had exertional dyspnea, angina or edema at the ankles. The nocturnal episodes became more frequent and severe, and the patient was hospitalized following a prolonged attack.

The family history was unknown to the patient. Past history was negative except for chronic bronchitis, diagnosed in 1924, and a tendency toward frequent "chest colds." Right mastoidectomy had been performed in 1934. Syphilis was denied by name and manifestations, as was antisyphilitic therapy.

Physical examination. The temperature was 98.4° F. (oral); pulse, 120, regular; respirations, 24 per minute; blood pressure, 230/110 mm. of mercury and 210/106 mm., right and left arm, respectively. The patient was slightly dyspneic and orthopneic but not acutely ill. The neck and superficial forehead veins were distended. A mastoidectomy scar on the right, bilateral arcus senilis, retinal arteriolo-

From the Department of Medicine, University of California School of Medicine, San Francisco 22.

Submitted September 16, 1954.

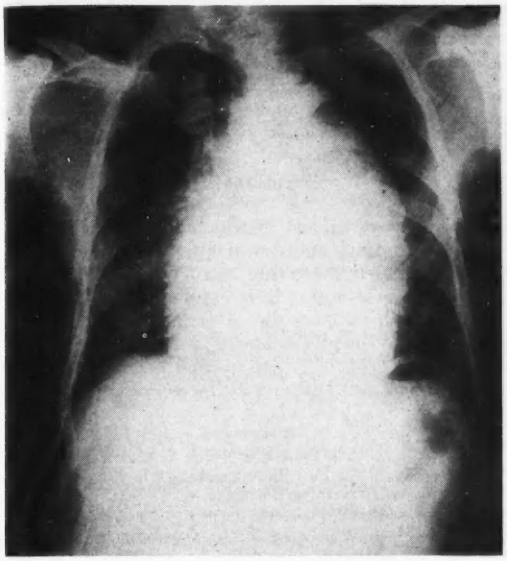

Figure 1.—Posteroanterior view of chest demonstrating (1) pronounced dilation of entire thoracic aorta, (2) widened shadow of innominate artery, (3) "double density" of aortic knob contrasted against lesser density of the dissecting aneurysm, and (4) intimal calcification visible at level of left fourth rib anteriorly.

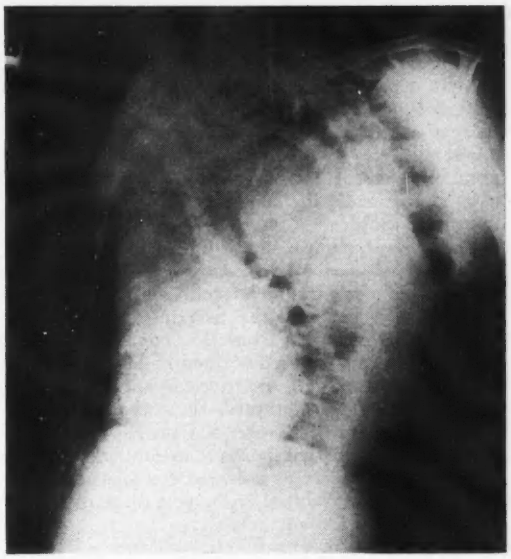

Figure 2.—Oblique view with Bucky technique showing diffuse dilation of entire thoracic aorta.

sclerosis and edentulous gums were noted. The trachea was displaced to the right; there was no tug. The chest was emphysematous; expansion was limited but equal. The lungs were hyper-resonant and free of rales, but the expiratory breath sounds were high-pitched and prolonged. The upper sternum and attached ribs pulsated vigorously during cardiac systole. The apex beat was not visible or palpable, and the area of cardiac dullness was masked by pulmonary emphysema. Parasternal dullness was noted in the second and third intercostal spaces bilaterally. A grade 4 (1 to 6 scale), harsh, aortic diastolic murmur obliterated the second aortic sound and was transmitted predominantly down the right sternal border, as well as over the precordium. Short, soft, nontransmitted systolic murmurs were heard over the aortic and mitral areas. Thrill, gallop and apical diastolic murmur were not present. Peripheral pulses were collapsing in character; Duroziez's, Traube's and de Musset's signs were present. The right carotid, brachial and radial pulses were more forceful than the left. A sharp and tender liver edge was felt five fingerbreadths below the right costal margin. There was moderate clubbing of the fingers and toes and the nail beds were dusky.

Laboratory. Results of laboratory tests were as follows: Hemoglobin, 15.3 gm. per 100 cc. of blood; packed cell volume, 42.5 per cent of whole blood; leukocytes, 8,200 per cu. mm. with normal differential; Mazzini test for syphilis, negative; nonprotein nitrogen content, 28 mg. per 100 cc. Urinalysis: specific gravity, 1.006; albumin, 4 plus; reaction for sugar, negative; rare erythrocytes and leukocytes and granular casts per high-power field in sediment. Alpha hemolytic streptococci grew on a culture of sputum. An electrocardiogram was characteristic of left ventricular hypertrophy. X-ray films of the chest, including a right oblique view with Bucky technique, are shown in Figures 1 and 2. Vital capacity was 1.4 liters. Arm-to-tongue circulation time was 30 seconds (decholin).

The patient was treated with digitalis, penicillin, potassium iodide and bronchodilators and was put on a diet restricting salt intake to 1 gm. Orthopnea and dyspnea subsided. The liver decreased in size and was no longer tender. There was a four-pound loss of body weight. Blood pressure stabilized at levels averaging 186/90 mm. and 168/88 mm., right and left arm, respectively. Arm-to-tongue circulation time four days after admission was 20 seconds. The patient was discharged on maintenance dosage of digitalis, a 2-gm. salt diet, and potassium iodide. He remained asymptomatic thereafter except for "chest colds."

The final diagnoses were: (1) Healed dissecting aneurysm of thoracic aorta with aortic insufficiency. (2) Hypertensive cardiovascular disease. (3) Myocardial insufficiency, secondary to 1 and 2. (4) Pulmonary emphysema and chronic bronchitis.

DISCUSSION

Peacock,[7] in 1863, was the first to emphasize that dissecting aortic aneurysm is not invariably fatal within a short period: "The patient may, however, rally from the first effects of the shock and survive for some months or years, and die ultimately from the cardiac disease and symptoms of obstruction to the circulation occasioned by the formation of the aneurysm or from secondary disease of other or-

gans." Among the 79 cases of healed dissecting aneurysm collected by Shennan, the causes of death were heart failure in 34, rupture of the aorta in 16, chronic nephritis in eight, and cerebral hemorrhage or thrombosis in seven. Excluding the cases in which the patient died of aortic rupture or unrelated diseases, the type and incidence of end stages closely parallel those of hypertensive cardiovascular disease. Occasionally the course of the heart failure is unusually rapid.[8]

The earliest clinical descriptions of murmurs associated with healed dissecting aneurysms generally mentioned variable systolic murmurs at the base. Letulle[5] reported the first instance of aortic insufficiency resulting from this condition. Aortic diastolic murmurs were described in 41 of 165 cases of both acute and chronic thoracic aorta dissection collected from the literature. In most of these the medial dissection had extended proximally to the aortic valves or to within 2 or 3 centimeters at the most. The specific mechanism whereby insufficiency of the valves is produced is thought to be dilatation or distortion of the aortic ring.[3]

There are no diagnostic clinical signs of healed dissecting aneurysm. Patients in whom aortic insufficiency and heart failure develop from this cause, but who have no previous history of severe thoracic pain, may be diagnosed as having syphilitic cardiovascular disease or chronic rheumatic heart disease.[3, 6] Considerable assistance can be obtained from a number of radiologic signs, of which the following are the most reliable: (1) double density of the aortic shadow resulting from a dense inner shadow in the region of the aortic knob superimposed on the less dense shadow of the dissecting aneurysm;[4] (2) widened shadow of the innominate artery, said to be pathognomonic;[11] (3) dense intimal calcification visible well within the lateral border of the aortic shadow;[1] and (4) widening of the entire thoracic aorta as shown by laminagraphic techniques.[9] Signs 1, 2 and 4 (as here enumerated) are clearly shown in Figures 1 and 2; sign 3 is not convincingly shown, since the aortic wall lateral to the linear streaks was only 8 mm. thick.

In the absence of autopsy confirmation, an irrefutable diagnosis of healed dissecting aneurysm cannot be made. However, the following constellation constitutes a well-defined entity: (1) history of unusually severe chest or back pain of hours' or days' duration, followed in several months or years by the onset of congestive heart failure; (2) presence of aortic insufficiency without stenosis, absence of significant mitral murmurs, negative serological tests for syphilis; (3) clinical or x-ray signs of aortic dilation or aneurysm, with any of the first three specific radiologic signs listed above.

SUMMARY

A case is described in which the clinical course, physical findings and radiologic data are characteristic of healed dissecting aneurysm involving the entire thoracic aorta. It is emphasized that 50 per cent of such patients die of congestive failure and that 25 per cent have aortic insufficiency indistinguishable clinically from that of syphilitic aortitis or chronic rheumatic heart disease.

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EDITORIAL

Poliomyelitis Immunization

FINAL EVALUATION of the field study of immunization against poliomyelitis with Salk vaccine nears completion. The original pilot studies with this vaccine were promising, there have been no adverse effects in the field study, and although there have been no premature announcements, the final analysis of this mass experiment is awaited with general optimism. Whether or not this killed virus vaccine should now be generally employed depends on the results of careful studies which, as we go to press, it appears will be reported soon by Dr. Thomas Francis, Jr.

An answer to this problem might have gone more slowly and perhaps more surely if it were extended for many years of painstaking study but the very urgency of the problem of poliomyelitis protection demanded a speedy answer. Some 440,000 children received the vaccine, a control group of 221,000 received placebo injections, and more than 1,000,000 children in the test areas were observed carefully as untreated controls. Comparisons within this experimental group for antibody levels and clinical attack rates will afford the working basis for further application of the vaccine.

No great number of methods for active immunization against other diseases have proved to be very effective. Smallpox, diphtheria, tetanus, whooping cough and yellow fever, have been thus controlled but there have been many failures and new successes have been laboriously achieved. Most of the previous mass experiments were activated by zealots who had to oppose scientific apathy and pessimism and sometimes public hostility. The present mass immunization experiment is the result of coordinated scientific effort combined with extraordinary public participation.

It is unnecessary to recount all the scientific observations which led up to the present method. Virus research contributed the nature of the pathogen, determined its effect in experimental animals, demonstrated the existence of three distinct strains of virus, and found that antibodies in the general population indicate experience with exposure to these viruses. Methods of tissue culture propagation have afforded an improved tool for study and finally a means for production of large amounts of relatively pure virus for use in vaccine.

The relatively recent proof that a period of viremia is a prelude to invasion of the central nervous system demonstrated that the virus is not an obligate parasite of the nerve cells and pointed to the possibility that before it invades the nervous system the virus might be vulnerable to systemic immune bodies.

The identification of antibodies against the three strains of virus in gamma globulin prepared from the population at large was an interesting by-path in the study of protection by systemic antibodies. Originally the use of gamma globulin was designed to test the hypothesis of protection by means of these antibodies. Early evidence of partial success caused the experimental nature of this study to be abandoned and led to the widespread and uncritical use of this product as the only agent which was known to protect against paralytic poliomyelitis. Unfortunately the use of this product as generally employed failed to introduce antibodies sufficiently early after exposure, especially in family contact where the problem was often one of simultaneous exposure. It thus failed to afford much information on the very point at issue. Almost unquestionably the value of gamma globulin is limited to those instances in which, especially in mass experiments and not in household contact, protection can be afforded either before exposure or at least very early after exposure.

Analysis of the field trial with Salk vaccine will consider the relative incidence of disease in vaccinated and control groups. This comparison will be

of great importance but the low incidence of naturally occurring infection can cause the comparative figures to be too small for a completely definitive opinion. Some failures of protection are encountered in the very best methods of immunization, for human beings are poor experimental animals, given to unpredictable and capricious variation. This suggests that the present field experiment should not terminate critical observation of the result of vaccination.

This study will also incorporate careful investigation of the rise in immune substances in the serum after vaccination. It seems logical to suppose that a rise in immune bodies should lead to protection from clinical attack but it may require several years of further experience to demonstrate that this is true. In previously successful methods for active immunization proof of clinical protection was not a matter of logical deduction or of laboratory data, but of accumulated statistical experience. The Francis report on the numerical study of the field trial must be succeeded by observation of the results in immunization of the population at large. It is important to recognize that, as was so ably pointed out by Magill in "The Immunologist and Evil Spirits" (Thomas P. Magill, Journal of Immunology, Vol. 74, No. 1, 1955), clinical resistance does not always parallel serum immunity.

It has been necessary to plan future activity in the expected event that the results reported by Francis are favorable. The National Foundation for Infantile Paralysis has stock-piled a supply of vaccine to be supplied free to children of the first and second grade and for all those who served for unvaccinated controls in the field trial. (In the sense of a purely scientific experiment it may be unfortunate that these controls should be lost for future comparison with vaccinated children. Humanitarian considerations make it unthinkable, however, that a volunteer control group should remain at risk if prophylaxis seems convincingly effective.) This vaccine will be promptly available and methods of administration will be planned by state and local health authorities.

Commercial laboratories which have provided the experimental vaccine are preparing further vaccine which will be available if the final report is favorable. The supply of this vaccine, which may be used by the physician as he chooses, will at least equal that provided by the Foundation and may be several times as great. There is every reason to believe that public demand for an effective vaccine will be tremendous and that available supplies may not be equal to this demand. Hence, deciding just how this additional supply shall be employed will necessitate the best judgment on the part of the physician.

The vaccine supplied by the Foundation will be given to children during the years of greatest risk, ages six and seven. It would seem appropriate at first to use the additional vaccine for children just above and just below this age group, perhaps from four to fourteen years, in order to protect areas of greatest risk and quickly to secure additional evidence regarding effectiveness. Additional uses, as in early pregnancy, would be at the discretion of the individual physician.

Vaccination will consist of three injections, the first two one week apart and the third four weeks later. Immunization should be completed as far as possible in advance of expected annual epidemics so as to afford maximum protection before probable exposure. This would indicate early employment in the more southerly regions.

The year 1954 witnessed the greatest cooperative venture in scientific effort and public participation in the history of preventive medicine. Whatever the content of the Francis report, final evaluation must await several years' experience. The further demand for immunization should proceed from the public—as pretty obviously it will—and it would seem unwise to propose that everyone must be vaccinated as promptly as possible. There will probably be improvements in the vaccine as time goes on. Other vaccines of entirely different nature may prove to be better agents. Live vaccines, devoid of paralytic properties, which may be administered by the natural route of feeding are under study by such investigators as Koprowski and Cox, Enders and Sabin and others and may eventually prove to afford better and more prolonged immunity. The necessity for booster doses and the frequency of their administration can only be developed as time goes on. We can only hope that the present vaccine may be a good answer, even if not the perfect answer, to the problem of poliomyelitis immunization.

Gamma globulin is still available for use as indicated. Its best use is for prophylaxis and modification of measles and for protection against infectious hepatitis. The use of this product for prevention of poliomyelitis is of very limited value; it is practically worthless in its usual employment in household exposure, especially when given in relatively small amounts. The cost of the recommended dosage of 0.2 cc. per pound of body weight is out of all proportion to its expected effectiveness except under most unusual circumstances.

California MEDICAL ASSOCIATION

NOTICES & REPORTS

Council Meeting Minutes

Tentative Draft: Minutes of the 410th Meeting of the Council of the California Medical Association, St. Francis Hotel, San Francisco, February 5, 1955.

The meeting was called to order by Chairman Lum in Room 210 of the St. Francis Hotel, San Francisco, at 9:30 a.m., Saturday, February 5, 1955.

Roll Call:

Present were President Morrison, President-elect Shipman, Vice-Speaker Bailey, Secretary Daniels, Editor Wilbur and Councilors West, Wheeler, Loos, Sampson, Pearman, Randel, Ray, Sherman, Lum, Bostick, Frees, Carey, Kirchner, Reynolds, and Varden.

Absent for cause, Speaker Charnock, Councilors Teall and Heron.

A quorum present and acting.

Present by invitation were Messrs. Hunton and Gillette of C.M.A. staff; legal counsel Howard Hassard; Messrs. Ben H. Read and Eugene Salisbury of the Public Health League of California; Dr. Dan O. Kilroy of the legislative committee; Mr. K. L. Hamman of California Physicians' Service; Mr. Rollen Waterson, health insurance consultant; county society executive secretaries Bannister of Orange, Donovan of Santa Clara, Foster of Sacramento, Geisert of Kern, Jensen of Fresno, Marvin of Riverside, Neick of San Francisco, Nute of San Diego, Thompson of San Joaquin and Wood of San Mateo; Drs. James C. Doyle of the legislative committee and Carl Hadley and Thomas J. Rossitto, county society secretaries of San Bernardino and Placer-Nevada-Sierra, respectively.

Present during a part of the meeting were Drs. Bert L. Halter and E. Francis Egleston of San Francisco County.

1. *Minutes for Approval:*

(a) On motion duly made and seconded, minutes of the 409th Council meeting, held December 11, 1954, were approved.

(b) On motion duly made and seconded, minutes of the 246th Executive Committee meeting, held December 11, 1954, were approved.

(c) On motion duly made and seconded, and after deletion of two items from the original draft, for later discussion, minutes of the 247th Executive Committee meeting, held January 13, 1955, were approved.

2. *Membership:*

(a) A report of membership as of February 4, 1955, was received and ordered filed.

(b) On motion duly made and seconded in each instance, ten (10) applicants were elected to Retired Membership. These were:

Arthur W. Allum, A. Lincoln Desser, Roy E. Fallas, A. F. J. Hansen, E. J. Rowan, John M. Schmoele, H. W. Vollmer, Los Angeles County; Trueman E. Bishop, San Diego County; George W. Hartman, Olav Kaarboe, San Francisco County.

(c) On motion duly made and seconded in each instance, 12 applicants were elected to Associate

ARLO A. MORRISON . . . . . President
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DONALD A. CHARNOCK, M.D. . . . . Speaker
WILBUR BAILEY, M.D. . . . . Vice-Speaker
DONALD D. LUM, M.D. . . . . Council Chairman
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Membership. These were: Theodore Carlton, Thad W. Penn, Dean C. Varney, Alameda-Contra Costa County; Donald Casad, Jane Jameson, Fresno County; Harry Kopman, W. J. Menke, Jr., R. V. Miller, Jr., Robert Stivelman, Leonard A. West, Los Angeles County; Paul W. Frame, Sr., Sacramento County; James F. Terrell, San Diego County.

(d) On motion duly made and seconded, reductions in dues were voted for 16 members for reasons of postgraduate study or illness.

(e) On motion duly made and seconded, eight members whose 1954 dues had been received since December 11, 1954, were voted reinstatement as active members.

3. *Financial:*

A report of bank balances, etc., as of February 4, 1955, was received and ordered filed.

4. *Legal Department:*

Mr. Hassard reported on several proposed legislative bills now before the State Legislature and stated that additional reports would be made when additional bills are available from the State Printer.

Mr. Hassard also reported on the status of litigation in San Diego County. On motion duly made and seconded, it was voted to reaffirm the agreement originally made with the San Diego County Medical Society relative to the expenses of this litigation.

Mr. Hassard stated that the California Physicians' Benevolence Fund has been incorporated as a nonprofit corporation and that amendments in the C.M.A. Constitution and By-Laws to effect this change from the present setup would be presented to the 1955 House of Delegates.

5. *Public Policy and Legislation:*

Dr. Dan O. Kilroy reported that the State Personnel Board had developed an examination for physicians seeking state employment. Such examination might be construed as duplicating the examining procedure of the State Board of Medical Examiners. On motion duly made and seconded, it was voted to urge the elimination of such examination by the State Personnel Board of physicians regularly licensed by the Board of Medical Examiners.

Dr. Kilroy also discussed a few legislative items and pointed out that the acceptance of the report of the Committee on Mental Health by the Council might be construed as binding the Council to approve legislative proposals reached by this committee in meeting with other groups. It was agreed that such construction was not warranted in the Council's acceptance of the committee's report.

Mr. Read reported that close to 6,000 bills, resolutions, etc., had been introduced in the opening session of the Legislature and that a close watch was being maintained on 453 measures in 39 categories. He stated that 58 bills had been introduced on the subject of pharmacy alone, 13 of them relating to dangerous drugs.

6. *State Department of Public Health:*

Dr. Malcolm H. Merrill, State Director of Public Health, reported on problems of sanitation arising in Los Angeles and San Diego counties and stated that a preliminary report is under preparation on the subject of air pollution. This report will point out the areas where further study of this problem is needed.

Dr. Merrill also reported that agreement had been reached with the statewide advisory committee on poliomyelitis that gamma globulin apparently has a very limited use in polio control but that the supplies available would be distributed as was done last year so long as they last. As to polio vaccine, Dr. Merrill reported that sufficient supplies for 9,000,000 inoculations were available and that the county health units would be urged to set up inoculation programs for first and second grade school children, to be activated if current studies show that the vaccine has value for prevention and if the National Institutes of Health license its production. If the vaccine is declared to be effective in polio prevention, the National Foundation for Infantile Paralysis will withdraw from the field of production and distribution and will leave this product in the pharmaceutical field.

Dr. Merrill reported on several other items, among them the proposal by the State Department of Public Health that it discontinue the gratis distribution of drugs for the treatment of syphilis. On motion duly made and seconded, it was voted to approve this proposal.

7. *Committee on Public Health and Public Agencies:*

Dr. Francis E. West, chairman of the Committee on Public Health and Public Agencies, stated that if the new polio vaccine proved beneficial, there would be an obligation on the county medical societies to work with local health departments in planning and executing inoculation programs.

Dr. West also discussed a proposal of the State Department of Public Health for establishment of a chronic disease epidemiology center and the inauguration of chronic disease studies. It was pointed out that a charitable foundation had agreed to finance this program for three years and that public funds would be needed to carry on this work if it were proposed to continue the program after the initial three-year period.

In response to questions, Dr. Merrill stated that the purpose of this study would be to collect data on heart disease, cancer, diabetes and other chronic dis-

eases and that the epidemiology center would be for study purposes only, not for treatment. He stated that his department did not expect the Council at this time to agree to the provision of state funds after the charitable foundation funds have been exhausted. He stated that his department wanted the Council to know what was being done in this direction and asked that the Council make known its disapproval of this project if it were disapproved. On motion duly made and seconded, it was voted to refer this proposal to a new subcommittee which should report back to the Council at a later meeting.

8. *California Medicine:*

On motion duly made and seconded, it was voted to appoint Dr. Victor Richards as a member of the Editorial Board of CALIFORNIA MEDICINE, to represent surgery, succeeding Dr. Frederick L. Reichert, resigned.

9. *Trustees of California Physicians' Service:*

On motion duly made and seconded, it was voted to approve the Chairman's selection of Dr. Henry A. Randel as a Council representative on the Board of Trustees of California Physicians' Service.

10. *Medical Services Commission:*

Dr. Hollis L. Carey, chairman of the Medical Services Commission, discussed deductible types of medical cost insurance and suggested that further study be given this form of coverage. Dr. Carey also discussed the possibility of providing medical care for the medically indigent; one member of the commission has been authorized to continue his studies on this subject, with the possibility of experimenting in smaller counties through the facilities of California Physicians' Service.

11. *Public Relations:*

Mr. Glenn Gillette reported on the progress of the distribution of personal messages by physicians to their patients. A total of more than 1,200,000 such messages have been sent to members at their request.

12. *Rollen Waterson Associates:*

Mr. Rollen Waterson reported that his organization was working with county societies on a variety of approaches to the problems of prepaid medical cost insurance and that 16 counties to date had approved the inauguration of a $6,000 income ceiling for California Physicians' Service.

Mr. Waterson also stated that he anticipated a reduced demand for the services of his organization and that, with Council approval, he would plan to accept other assignments not in conflict with the Association's program, and to reduce his fees to the Association.

Dr. Sherman reported that the San Francisco Medical Society by a three-to-one vote of its members had requested a $6,000 C.P.S. ceiling but that a committee of the society had asked reconsideration so as to make it possible to secure a higher level of fees for certain visits. Dr. Sherman offered a resolution reading as follows:

"The Council of the California Medical Association requests the Board of Trustees of California Physicians' Service to take the steps needed to ascertain those geographical areas, if any, in this state in which the prevailing fees customarily charged noncharity patients for follow-up office, routine hospital and home visits are higher than the fees for such calls or visits in the C.P.S. $4,200-$6,000 fee schedule, and after determining that the prevailing fees for such calls or visits are higher in any given area, then to adjust the $4,200-$6,000 fee schedule, at the request of the county society, as applied in the area accordingly, provided that at present follow-up office calls shall not exceed $5, hospital calls $5 and home visits $7."

After discussion, on motion duly made and seconded, it was voted to refer the proposed resolution to the appropriate subcommittee of the Medical Services Commission.

13. *California Physicians' Service:*

Mr. K. L. Hamman reported a January 31 membership of C.P.S. of 681,551, a gain of 63,410 over the preceding year. Physician membership at the same date was 12,123, a gain of 729 in one year. Mr. Hamman also reported that claims review committees are operating in 18 counties; the Veterans Administration program, he said, is handling 25 per cent of all VA outpatient care through private sources in the country. Efforts have been made in some quarters, he stated, to reduce this coverage.

In response to a question, Mr. Hamman stated that two contracts, both in Santa Clara County, had been written under the $6,000 ceiling.

14. *Committee on Scientific Work:*

Dr. Daniels, chairman of the Committee on Scientific Work, presented a list of guest speakers for the 1955 Annual Session and sought approval of their scheduled appearances. On motion duly made and seconded it was voted that the Council officially invite those on this list.

15. *Committee on Rural Health:*

A letter from Dr. Henry A. Randel, chairman of the Committee on Rural Health was read, asking that in view of the enlarged scope of the committee's work the official name be changed to Committee on Rural and Community Health. On motion duly made and seconded it was voted to approve this change of name.

16. *Tuberculosis Survey:*

Dr. Reynolds presented the final report of a committee named some months earlier to review, with

others, the tuberculosis morbidity and care situation in Solano County. He was thanked for his work in this field.

17. *Los Angeles County Physicians' Aid Association:*

On motion duly made and seconded it was voted to allow the Los Angeles County Physicians' Aid Association to use the Association's membership list in publicizing the work of the organization.

18. *Assistance to County Societies:*

On motion duly made and seconded it was voted to cooperate for an additional four months, starting January 9, 1955, with the Los Angeles County Medical Association in producing a local television program.

19. *Alternate Delegates to A.M.A.:*

On motion duly made and seconded it was voted to continue the policy of meeting expenses of Alternate Delegates to the American Medical Association in attending one A.M.A. meeting each year.

Time and Place of Next Council Meeting:

The Chairman announced that the next meeting of the Council would be held in Los Angeles around the latter part of March or early April.

Adjournment:

There being no further business to come before it, the meeting was adjourned at 4:55 p.m.

DONALD D. LUM, M.D., *Chairman*
ALBERT C. DANIELS, M.D., *Secretary*

In Memoriam

BLACKSHAW, JOSEPH B. Died in Sebastopol, February 17, 1955, aged 76. Graduate of Hahnemann Medical College of the Pacific, San Francisco, 1911. Licensed in California in 1911. Doctor Blackshaw was a retired member of the Sonoma County Medical Society, the California Medical Association, and an associate member of the American Medical Association.

✤

EARL, HARRY D. Died in Yucaipa, February 15, 1955, aged 73. Graduate of Keokuk Medical College, College of Physicians and Surgeons, Iowa, 1906. Licensed in California in 1922. Doctor Earl was a retired member of the Los Angeles County Medical Association, the California Medical Association, and an associate member of the American Medical Association.

✤

FOLTZ, CLARENCE B. Died in Vallejo, January 23, 1955, of acute myocardial infarction, aged 69. Graduate of Creighton University School of Medicine, Omaha, Nebraska, 1914. Licensed in California in 1918. Doctor Foltz was a member of the Alameda-Contra Costa Medical Association.

✤

HITCHCOCK, HAROLD H. Died in Oakland, February 6, 1955, aged 61, of coronary occlusion with myocardial infarction. Graduate of the University of California Medical School, Berkeley-San Francisco, 1918. Licensed in California in 1918. Doctor Hitchcock was a member of the Alameda-Contra Costa Medical Association.

✤

LIFSCHUTZ, JACOB. Died in Los Angeles, February 4, 1955, aged 65. Graduate of Rush Medical College, Chicago, Illinois, 1916. Licensed in California in 1943. Doctor Lifschutz was a member of the Los Angeles County Medical Association.

✤

MELNIK, MORRIS. Died in Boston, Massachusetts, January 24, 1955, aged 46, of coronary artery disease following surgery. Graduate of the University of Michigan Medical School, Ann Arbor, 1932. Licensed in California in 1933. Doctor Melnik was a member of the Los Angeles County Medical Association.

MORTENSEN, WILLIAM S. Died in Los Angeles, February 10, 1955, aged 75, of coronary thrombosis. Graduate of Rush Medical College, Chicago, Illinois, 1903. Licensed in California in 1906. Doctor Mortensen was a retired member of the Los Angeles County Medical Association, the California Medical Association, and an associate member of the American Medical Association.

✤

PAINE, NORMAN C. Died in Glendale, February 12, 1955, aged 62, of coronary artery disease. Graduate of Rush Medical College, Chicago, Illinois, 1919. Licensed in California in 1921. Doctor Paine was a member of the Los Angeles County Medical Association.

✤

ROGERS, JOHN D. Died December 27, 1954, aged 62, of carcinoma. Graduate of the State University of Iowa College of Medicine, Iowa City, 1920. Licensed in California in 1921. Doctor Rogers was a member of the Los Angeles County Medical Association.

✤

SHELTON, E. KOST. Died in Westwood, February 22, 1955, aged 67. Graduate of the University of Colorado School of Medicine, Denver, 1911. Licensed in California in 1929. Doctor Shelton was a member of the Los Angeles County Medical Association.

✤

SHOLL, HARRY E. Died in San Francisco, December 8, 1954, of carcinoma of the colon. Graduate of the Hahnemann Medical College and Hospital, Chicago, Illinois, 1906. Licensed in California in 1930. Doctor Sholl was a member of the Solano County Medical Society.

✤

STOLL, ARTHUR H. Died in Oxnard, January 27, 1955, aged 72. Graduate of Northwestern University Medical School, Chicago, Illinois, 1906. Licensed in California in 1923. Doctor Stoll was a retired member of the Ventura County Medical Society, the California Medical Association, and an associate member of the American Medical Association.

WOMAN'S AUXILIARY
TO THE CALIFORNIA MEDICAL ASSOCIATION

DISTRICT COUNCILORS ARE MEMBERS OF THE BOARD

The councilor districts of the Auxiliary are identical in geographical scope with those of the California Medical Association. District Councilors are nominated from the floor of the Auxiliary convention by voting delegates from their respective districts, and serve for two years, or until their successors assume office.

The district Councilor serves as an advisor to the auxiliaries in her district; she visits each of the organized auxiliaries at least once each year, and she also assists in organizing new component auxiliaries where none exist. District Councilors are members of the Board of Directors of the State Auxiliary.

Serving as district councilors this year are: First District—Mrs. John L. Gallagher, San Diego. Second District—Mrs. John J. Montanus, Santa Ana. Third District—Mrs. Newell Jones, Encino. Fourth District—Mrs. Richard L. French, North Hollywood. Fifth District—Mrs. Alexander Cruden, Saticoy. Sixth District—Mrs. Kendall B. Holmes, Fresno. Seventh District—Mrs. R. Stanley Kneeshaw, San Jose. Eighth District—Mrs. Clarence Nelson, San Francisco. Ninth District—Mrs. Harry Ford, Berkeley. Tenth District—Mrs. Irwin Shankman, Vallejo. Eleventh District—Mrs. O. F. Lang, Grass Valley.

* * *

PUBLIC RELATIONS MANUAL PAYS TRIBUTE TO AUXILIARY

One of the finest Public Relations manuals ever published is the one prepared last fall by the Department of Public Relations of the American Medical Association. It consists of 112 pages filled with practical, usable information on how county medical societies can win added respect and renewed confidence of the people in their communities.

The manual gives detailed information about such PR projects as emergency call systems, mediation committees, speakers' bureaus, press relations, and public service projects. Several pages are devoted to discussions of the role the Woman's Auxiliary can play in winning the good will of the public.

"Only a brief resume of some typical Auxiliary public relations projects can be given in this manual, but by scanning this list, medical societies who have not enlisted the aid of auxiliary members in their PR campaign will realize that they are overlooking an untapped reservoir of PR resources."

The manual then goes on to list some of the major activities and projects of auxiliaries:

Educational Activities. "One of the main aims of the Woman's Auxiliary is to bring to the general public accurate information on a variety of health and medical subjects." In previous issues this year, we have told you how our auxiliaries sponsor open meetings to which representatives of other organizations are invited; we have pointed out the effective work done by our members in selling subscriptions to *Today's Health*.

Medical Projects. Under this heading, the manual lists nurse recruitment, hospital auxiliaries, aid to old people, children and the handicapped, and other medical philanthropies. Our auxiliaries in California have been very active in all of these activities, especially in the field of nurse recruitment.

Legislative Activities. Although we do not take part in legislative work as a group, but rather as individual doctors' wives, the manual states that "medical auxiliaries have won their PR spurs in more than one instance by providing wonderful assistance in medical society legislative programs."

The chapter on auxiliaries concludes thus: "Wise medical societies know that the medical auxiliary is a close ally in a concerted public relations program."

* * *

ARE YOU GOING TO THE CONVENTION IN ATLANTIC CITY?

Many of our doctors will be attending the National Convention in Atlantic City in June; it would be a big help to us if their wives would volunteer to serve as Auxiliary delegates. They can notify the president of their local county Auxiliary, or write directly to me.

* * *

HOW TO MAKE A JOB A JOY

In her message to us in the current *Bulletin*, our national president, Mrs. George Turner, gave us this sage bit of advice, which is probably just as applicable to jobs in the medical society as in the auxiliary:

"Smile as you work; a smile is a curve that can set a lot of things straight."

MRS. FREDERICK J. MILLER, *President*

NEWS & NOTES

NATIONAL • STATE • COUNTY

ALAMEDA

Dr. Alexis F. Hartmann, professor of pediatrics and head of the department of pediatrics at Washington University School of Medicine in St. Louis, will be visiting lecturer for the fourth annual **Clifford Sweet Lectureship** on May 18, 19 and 20 at Children's Hospital of the East Bay in Oakland. The event was instituted three years ago by the medical staff of the hospital in honor of Dr. Sweet, who is emeritus chief of medicine, and formerly for 30 years was chief of the department of medicine there.

Beginning at 10 a.m. on Wednesday, the program will continue with both morning and afternoon meetings through Thursday and Friday at the hospital, and will culminate with the Sweet lecture on Friday evening following a banquet at the Berkeley Women's City Club in Berkeley. All sessions will be open to physicians interested in attending. Reservations for the Friday night banquet and lecture may be made through Children's Hospital of the East Bay.

SAN FRANCISCO

The California chapter of the **American College of Chest Physicians** will hold a business and scientific meeting in San Francisco at the Sheraton-Palace Hotel, April 30, 1955, the day before the opening of the California Medical Association's annual meeting. The business meeting will begin at 1:30 p.m. and the scientific program at 2 o'clock.

The 21st annual meeting of the national organization, the American College of Chest Physicians, is scheduled for June 1 to 5 at Atlantic City.

* * *

The Northern California Rheumatism Association will hold a dinner meeting at the University Club in San Francisco on Saturday, April 30, at 6:30 p.m. The guest speaker will be Dr. Edward W. Boland of Los Angeles, president of the American Rheumatism Association. His subject is "Experiences with the Newer Synthetic Steroids in Rheumatoid Arthritis."

Any physician may make reservations for the dinner by sending a check for $6.00 to the Northern California Rheumatism Association, 1 Tilton Avenue, San Mateo, California, on or before April 25, 1955.

* * *

The Christian Medical Society, Bay Area Chapter, will hold a dinner meeting in San Francisco, Tuesday evening, May 3, at 7 p.m. in the Garden Room of the YWCA. All interested physicians and their wives are invited to attend. Reservations at $2.00 a plate may be made by writing to Merrill J. Alexander, M.D., 581 Belvedere St., San Francisco.

GENERAL

The American College of Gastroenterology, in cooperation with the Ames Company of Elkhart, Indiana, recently announced the establishment of the Ames Award **contest for the best papers in gastroenterology.** There will be three classes of awards as follows: for fellows or residents in gastroenterology, two prizes, one of $250 and the other of $50; for first or second year interns, two prizes of the same amounts; for the best paper published in *The American Journal of Gastroenterology* during the twelve months ending June 20, 1955, for which no prize has been previously awarded, a prize of $100. Further information may be obtained from the Research Committee, American College of Gastroenterology, 33 West 60th St., New York 23, N. Y.

* * *

The tenth annual **Schering Award competition** for medical students has opened, it was announced by Robert W. Burlew, M.D., chairman of the award committee. Its aim is to encourage medical writing and exploration of current research literature.

Titles of three subjects on which American and Canadian students are invited to submit papers this year are: Current Concepts in the Management of Osteoporosis; Prevention and Treatment of Blood Transfusion Reactions; and Recent Trends in the Clinical Use of Adrenocortical Steroids.

A $500 first prize and a second prize of $250 will be awarded for each of the three subjects. Information and instructions for the award competition are available from the Schering Award Committee, 60 Orange Street, Bloomfield, N. J.

* * *

The 54th annual meeting of the **American Proctologic Society** will be held at the Hotel Statler, New York City, June 1 to 4, 1955, it was announced recently.

* * *

The board of directors of the Passano Foundation recently announced that Dr. Vincent du Vigneaud, professor and chairman of the department of biochemistry, Cornell University Medical College, has been selected as the recipient of the $5,000 **Passano Foundation Award** for 1955. On Wednesday evening, June 8, during the week of the American Medical Association convention in Atlantic City, a reception and dinner will be held at the Traymore Hotel to honor Dr. du Vigneaud. The award will be formally made at that time. Dr. E. C. Kendall, a former recipient of the award will introduce Dr. du Vigneaud. Dr. Elmer Hess, the incoming president of the A.M.A., will make one of the principal addresses. Officers and trustees of the Association will be among the guests.

The award is made to Dr. du Vigneaud in recognition of his investigation of the chemical and physiologic nature of the hormones of the posterior portion of the pituitary gland. This culminated in the identification and synthesis of oxytocin and vasopressin.

POSTGRADUATE EDUCATION NOTICES

UNIVERSITY OF CALIFORNIA AT LOS ANGELES

Announces the following spring courses:

Diagnostic Psychological Testing—April 14-May 9, 1955.

Plastic Repair of Superficial Wounds—April 22 and 23, 1955.

Techniques of Surgery of Malignancies of Oral Cavity, Maxillary, Parotid Gland and Neck—April 25 and 26, 1955.

Physiology, Anatomy and Surgery of the Temporal Bone—April 28, 29, 30, 1955.

Surgical Anatomy of the Thorax, Abdomen and Pelvis—April 28-May 23, 1955.

Obstetrics and Gynecology—early May.

Fevers of Unexplained Origin with Emphasis on Brucellosis—May, 1955.

4th Annual Laboratory Technicians Symposium—June 18 and 19, 1955.

Contact: Thomas H. Sternberg, M.D., Director of Postgraduate Medical Education, U.C.L.A., Los Angeles 24.

UNIVERSITY OF CALIFORNIA, SAN FRANCISCO

In San Francisco:

Recent Advances in Internal Medicine — April 18 to April 22.

Pediatric Conference—September (dates to be announced later).

Conference on Applied Therapeutics—October 17 to October 19.

Conference on Gynecology and Obstetrics—October 20 and October 21.

Ophthalmological Conference—December 5 to December 9.

In East Oakland:

Medicine for General Practitioners—Tuesday evenings, September 20 to December 6.

In Berkeley:

Postgraduate Conference—Wednesday evenings, September to December (dates to be announced later).

In San Mateo:

Evening Lectures in Medicine—Thursday evenings, September 22 to December 15.

Contact: Office of Medical Extension, University of California Medical Center, San Francisco 22.

UNIVERSITY OF SOUTHERN CALIFORNIA AT LOS ANGELES

The Medical Extension Education Division of the University of Southern California School of Medicine announces:

March 7 through May 23—Course No. 882—First Section, Part b: "The Clinical Application of Radioactive Isotopes," will be presented from April 18 through May 23, at the Cedars of Lebanon Hospital. This course is especially designed for physicians in the field of radiology and those preparing for certification in this specialty.

Contact: For information and registration: Robert S. Cleland, M.D., Medical Extension Education, University of Southern California, School of Medicine, 2025 Zonal Avenue, Los Angeles 23.

CALIFORNIA MEDICAL ASSOCIATION, POSTGRADUATE ACTIVITIES INSTITUTES

Sacramento Valley Counties—Cal-Neva Biltmore Hotel and Lodge—June 15, 16, 17, 1955.

Contact: C. A. Broaddus, M.D., Director of Postgraduate Activities, P.O. Box A1, Carmel, California.

Medical Dates Bulletin

This bulletin of the dates of postgraduate education assemblies and the meetings of various medical organizations in California is supplied by the Committee on Postgraduate Activities of the California Medical Association. In order that they may be listed here, please send communications relating to your future medical or surgical programs to: C. A. Broaddus, M.D., P.O. Box A-1, Carmel, California.

APRIL MEETINGS

Western Industrial Medical Association announces its 14th annual meeting in conjunction with the California Medical Association Meeting, in San Francisco, at 8:15 a.m. to 5:00 p.m. at the Sir Francis Drake Hotel (Empire Room). No registration fee. April 30, 1955.

MAY MEETINGS

California Medical Association announces: Annual Session, May 1-4, 1955, San Francisco.

A comprehensive five-day course in Poliomyelitis is offered by the Orthopedic Hospital and the Rancho Los Amigos Respiratory Center, Los Angeles. May 2 to 6, 1955.

Contact: Polio Teaching Program, Orthopedic Hospital, 2400 Flower St., Los Angeles 7.

JUNE MEETINGS

American Medical Association announces: Annual Session, 1955, Atlantic City, June 6 to 10, 1955.

OCTOBER MEETINGS

California Society of Internal Medicine meeting at Biltmore Hotel, Santa Barbara, October 1, 1955.

Contact: Mildred D. Coleman, Secretary, 384 Post St., San Francisco.

San Francisco Heart Association announces the Twenty-sixth Annual Postgraduate Symposium on Heart Disease, at St. Francis Hotel, San Francisco. October 5, 6, 7, 1955.

Contact: 604 Mission St., San Francisco 5.

The 1955 Scientific Assembly of the California Academy of General Practice will be held in San Francisco, at the Sheraton-Palace Hotel, October 9-12, 1955.

Contact: William W. Rogers, executive secretary, 461 Market St., San Francisco.

NOVEMBER MEETINGS

American Medical Association announces: Clinical Session, 1955, at Boston, November 29 to December 2, 1955.

INFORMATION

The Physician's Role in Workmen's Compensation

A PHYSICIAN treating patients under the provisions of the Workmen's Compensation Act assumes special relationships, responsibilities, and duties not all of which are common to private practice. To the patient the duty is to see that he receives all medical care necessary to effect his early recovery, return him to a wage earning status as soon as proper and possible, and, so far as possible, reduce his permanent disabilities to a minimum. To the employer and his insurance carrier he owes the duty to furnish such necessary medical care and to properly render complete reports in each case so that benefits due the patient may be promptly paid. To both he owes the responsibility of determining to the best of his ability and on an impartial basis questions which may arise, such as whether the patient is or is not able to return to work, whether the condition from which the patient is suffering is due to the alleged injury, of what exact elements any permanent disability may consist, etc.

Without considerable knowledge of what is necessarily required of him, and a willingness to meet these requirements, no physician can hope to become a success in this field. The need for medical panels has developed largely because only a comparatively few physicians have prepared themselves to meet the necessary requirements of learning the problems involved, rendering adequate reports, handling other necessary detail and solving the many problems that are inherent in the handling of Workmen's Compensation cases.

For various reasons, including requirements of the Industrial Accident Commission, the carriers must demand adequate reports, etc., and industrial injury cases will naturally tend to flow to those physicians who are qualified and will take the time to care for these details. In the hope of bringing more physicians into the field of industrial medicine and developing a better understanding of the problems of the employee, the employer, the insurance carrier, and the Industrial Accident Commission, this article has been prepared.

The Workmen's Compensation Act was developed as a social measure designed to place upon industry the responsibility for treatment of occupational injuries and diseases. Industry has two major burdens placed upon it: (1) To render such medical care as is necessary to restore the injured employee to his job as quickly as possible; (2) industry is expected to reimburse the employee with cash compensation to replace in part at least wages lost during the period of unemployment while convalescing from the industrial injury or illness. This is the basic social purpose of the Workmen's Compensation Law.

PREFACE

In 1950, a committee formed by the various insurance carriers writing workmen's compensation in the State of California was developed under the leadership of Mr. Gordon H. Snow.

At that same time, a committee was formed by the California Medical Association to meet with representatives of the insurance industry and meetings have been held continuously up to the present.

A great deal of difficulty that has been present in the application and conduct of medical services rendered under the workmen's compensation laws in the State of California has been the result of misunderstanding and confusion on the part of both the insurance industry and the medical profession. In order to try to clarify the problem, an article containing general instructions and information has been mutually prepared by these two committees. It is hoped that with a more complete understanding of each other's problems many of the unnecessary difficulties that have arisen in the past may be obviated in the future.

The material presented is not designed to be completely comprehensive, but it does point up the responsibilities of the employer, the patient, the insurance industry and the attending physician under the workmen's compensation law in the State of California.

It is our hope that it will create a better understanding between all of those concerned with this problem and thereby improve the quality of medical care rendered to this group of patients in the practice of medicine in the State of California. Proper understanding of each other's problems and mutual respect will do a great deal toward this end.

It is with this thought in mind that the article herewith was prepared.

INSURANCE COMMITTEE: Gordon H. Snow, Pacific Indemnity Company, Los Angeles, chairman; Rene Claudon, Industrial Indemnity Company, San Francisco; E. E. Bryan, State Compensation Insurance Fund, San Francisco; Jack Southall, Liberty Mutual Insurance Company, San Francisco; M. A. Lavore, American Associated Insurance Companies, Los Angeles; Richard H. Quigley, California Casualty Indemnity Exchange, San Francisco.

C.M.A. COMMITTEE: Francis J. Cox, M.D., San Francisco, chairman; Donald Cass, M.D., Los Angeles; Donald A. Carson, M.D., San Francisco; Frank A. MacDonald, M.D., Sacramento; George Maner, M.D., Los Angeles.

In addition, each individual employer in industry must have a vital interest in the prompt recovery of an injured employee since the absence of an experienced employee can directly interfere with the operation of his plan. In this respect, there are valid third party interests in the management of industrial medicine and surgery that are not present in the private practice of medicine.

The insurance industry, in protecting the financial responsibility of an individual employer, is simply acting as an agent for that employer and hence in many respects must be assumed to have the prerogatives and rights of the individual employer so far as controlling the care of the injured workman is concerned.

The Industrial Accident Commission, on the other hand, is the governmental agency charged with the determination of the laws written into the Workmen's Compensation Act. This governmental agency has two major functions: (1) Its first purpose is to act as a court in adjudicating claims of employees for compensation and propriety of medical care; (2) its second function is to act as an administrative body in maintaining statistics, records of the injury or disease, and the formulation of proper measures to prevent accidents or to eliminate disease hazards in industry.

The contact of the physician with the Industrial Accident Commission is primarily concerned with the first function but the attending physician must recognize the valid interest of the Commission in its secondary function.

WHAT CASES ARE COMPENSABLE

Generally, any employee covered by the Workmen's Compensation Act, who sustains injury or contracts an occupational disease, which injury or disease arises out of *and* occurs in the course of the employment, is entitled to medical care under the Compensation Act. This question has many facets, however, and all the answers cannot be given herein. It is suggested that the pamphlet, "Information Regarding the Workmen's Compensation Law of California," published by the Industrial Accident Commission, be carefully reviewed with special reference to page 7. Questions, however, will arise, and these should be promptly discussed with the insurance carrier to determine whether it will accept the case as compensable or whether the physician must look to the patient for payment of his account. Not always will the insurance carrier be prepared to give an immediate answer as investigation may be necessary to determine the facts of the case.

Where the identity of the insurance carrier is unknown to the doctor, contact should be made directly with the employer to obtain this information. Thereafter, further contact with the employer probably will be unnecessary as the carrier will perform all functions normally chargeable to the employer under the provisions of the Workmen's Compensation Act.

Generally speaking, in issuing its policy the insurance company undertakes to secure the employer against liability imposed upon him by the Workmen's Compensation Act. In addition, the carrier is very anxious to assure the employer that he will be relieved from all of the detail of handling any industrial injuries or diseases which occur as a result of the operations of the business insofar as this is possible under the law. Therefore, the carrier is anxious that all contact concerning an industrial injury or disease be made with it rather than with the employer.

WHO MAY TREAT OCCUPATIONAL INJURIES

The Workmen's Compensation Act provides for treatment by a "physician," which term is defined to include (and by this definition is limited to) physicians and surgeons, optometrists, dentists, chiropodists, osteopaths and chiropractic practitioners duly licensed and subject to the limitations in the scope of their respective practices as defined by California State Law.

WHO MAY SELECT THE ATTENDING PHYSICIAN

By the law, and its interpretation by the Industrial Accident Commission and our Courts of Appeal, the employer must furnish treatment to an employee entitled thereto. The employer, or if he be insured the insurance carrier, has the right to designate the attending or consulting physicians. In addition, the employee may have attending physicians of his own choice, at his own expense. The employer or insurance carrier may be held for treatment procured by the patient, if his employer, having knowledge of the injury, does not fulfill the obligation to provide treatment. Should the patient absent himself from treatment for more than one year, the physician should not render treatment or offer any advice which might be construed as treatment without specific authorization from the insurance carrier. The employee may request one change of physicians, whereupon the insurance carrier must name a panel of three competent physicians from which the employee may make his selection.

TREATMENT GENERALLY

History of Injury

The history should include the date, time, and place, and be obtained in sufficient detail to explain

what the patient was doing and how he alleges he was injured and should be reported in full. This is necessary so the insurance carrier will have a complete picture of the case and so the physician may determine whether the alleged injury logically fits into the history of the accident as related. The patient's past history should also be taken to determine if the physician's opinion or treatment of the case will be affected.

Examination and Diagnosis

The examination should be sufficiently thorough for accurate and complete diagnosis. It is feared by some that too often the patient more or less diagnoses his own complaint by such statement as "I was lifting and strained my back." The patient may be sincere in his statement but a carefully taken history and thorough examination might lead to an entirely different opinion, diagnosis, or type of treatment. The diagnosis should be complete in detail. For example, if a fracture is diagnosed, show what bone and portion is involved, the exact nature of the fracture, whether it enters a joint and, if so, what joint. A complete diagnosis is very necessary as a matter of record and without it the insurance carrier cannot establish proper legal reserves to cover the anticipated cost of the case. Should the physician feel the condition is not occupationally related, he should so state and give his reasons for such conclusions.

X-rays

The carriers will pay for all *necessary* x-rays; however, thought should be given as to whether x-rays are indicated. A detailed written report of x-ray findings should be submitted showing not only what evidence of trauma is or is not found but commenting on the presence or absence of other pathological changes whether congenital or of more recent development.

Nature of Treatment

Treatment appropriate to the type of injury should be rendered, the appropriateness to be determined by the customary treatment rendered by qualified physicians generally treating such type of injury. Injections of various drugs are in order if commonly used as a recognized therapeutic aid considering the nature of the injury. The over-all welfare of the patient is of prime importance. Under the California law, the injured employee is entitled to all medical treatment required to cure or relieve from the effects of the injury.

Frequency of Treatment

Here, again, adequate treatment must be rendered. Certain injuries such as burns, infections, etc., may necessarily require treatment daily including Saturdays, Sundays, and holidays. Two or three treatments per week, at least after the acute stages have passed, appear to be adequate as demonstrated by the general practice of the majority of physicians. It is interesting to note the number of cases reported wherein treatment is rendered five days per week but not on week ends. The attending physician should determine treatment frequency (never the office nurse or the doctor's secretary), based on the actual needs of the individual patient. Office visits should continue only so long as is necessary. Remember that many patients must lose wages for time spent visiting the physician's office and are not entitled to reimbursement for this loss under the law. Hospital visits charged for should be limited to those reasonably necessary.

Drugs and Medical Supplies

The responsibility for arranging to furnish necessary drugs for home use is the responsibility of the doctor. It is proper to instruct the pharmacy to bill the insurance carrier directly. Excessive quantities of the drugs prescribed should be avoided.

Hospital Care

The average industrial case is expected to be cared for at ward rates. Where severity of injury or disease requires private or semi-private hospital accommodations they can and should be furnished. Should the patient not require but desire a private room, the carrier and the hospital should be advised and arrangements made for the patient to bear the extra expense. The period of hospitalization should be as long, but no longer, than necessary. Hospital costs under present conditions amount to a considerable figure and hospitalization should be terminated as soon as the patient's condition is such as to warrant it.

Nursing Care

Special nursing services are in order when *necessary* and only for so long as necessary. It is suggested that in cases requiring hospital or nursing care the insurance carrier be promptly advised.

Artificial Members or Braces

The injured employee is entitled to artificial members or braces when indicated by the extent of injury, after proper consultation between the doctor, the carrier, and the appliance maker. The furnishing of such items should be arranged in advance with the insurance carriers.

Consultation

The insurance company by law properly retains the right to engage a consultant of its own choice.

Therefore, it is necessary in the average case to consult the insurance carrier to obtain consent for consultation. Medical emergencies may require immediate direct choice of consultant by the attending physician. The insurance carrier, however, should be promptly notified if this course of procedure is followed.

Specialists' Care

If the attending physician feels it advisable that the patient be referred to a specialist for treatment, such referral should be arranged following consultation with the insurance carrier (except in case of emergency). In such event the specialist shall be regarded as the attending physician.

REPORTS IN GENERAL

The standard forms as approved by the carriers and the California Medical Association should be used to the exclusion of other forms. The standard forms can, if desired, be adapted to the use of the individual physician by changing the heading to include his name and address. The purpose of creating the standard forms was to eliminate the use of various forms printed by the individual doctors, insurance carriers, etc., and their use will simplify clerical work in the physician's office. Copies of all reports should be retained in the physician's file. It is highly important that uniform terminology be adopted in the reports. It is urgently suggested that each physician thoroughly acquaint himself with the booklet "Evaluation of Industrial Disability," prepared by the California Medical Association Committee, headed by Dr. Packard Thurber in collaboration with members of the staff of the Industrial Accident Commission and other interested parties. Use of the terminology and methods of evaluating permanent disabilities as outlined therein will facilitate the work of the Industrial Accident Commission and the insurance carriers and relieve the attending physician of numerous inquiries from the insurance carriers as to the exact nature of the injury and the factors of disability involved.

Doctor's First Report of Work Injury*

Standard Form No. 5021 as required by the State Division of Labor Statistics and Research *must be* used for this report. Every question, including "Remarks" on this form, as is true of all other forms, serves an important purpose and must be answered. Answers should be in sufficient detail to give an adequate history of the accident, the examination findings, the diagnosis, detailed x-ray findings, a description of the treatment rendered, the physician's prognosis as to what, if any, permanent disability may result and a statement regarding preexisting injuries or diseases which might affect the patient's recovery or any permanent disability which may result. A report of this form must, by law, be personally signed by the physician to be valid evidence and forwarded immediately to the Division of Labor Statistics and Research, P. O. Box 965, San Francisco 3, California. This form should be furnished in duplicate to the insurance carrier within five days.

Compensation Orders or Disability Slips‡

To promptly pay the patient weekly disability compensation, it is necessary that the insurance carrier check frequently regarding the patient's work status. Cooperation with these companies requiring use of compensation orders or slips is urged. Forms (5020C) requested for this purpose should be promptly signed and returned; otherwise the patient will be without needed funds. To those doctors wishing to render an exceptional service of great value to their patients and the carriers, an automatic system of reporting disability is suggested, as follows: Determine the date of patient's first disability from work and on every sixth day thereafter so long as temporary disability may continue forward to the insurance carrier a so-called disability slip. Automatic submissions of these slips results in very prompt payment of compensation. Forms for this purpose will be supplied by the insurance carrier involved. It should be borne in mind that disability may be partial as well as total, and, if the former, a light job might be found by the employer enabling the patient to return to a wage-earning status, thus improving his psychological and financial position.

Doctor's Supplemental Report†

Standard Form No. 5020A has been provided by which the insurance carrier may be kept informed of the progress of the case. It should be submitted weekly during the acute stages of a serious case and monthly thereafter. It should be submitted in triplicate and should be in sufficient detail to give the insurance carrier a full picture of the case as it progresses. No special fee is allowed for completion of this form.

Detailed Progress Reports

The insurance carriers, for several reasons, may require more information than would appear on the Doctor's Supplemental Report. They must, at all times, as required by law, maintain reserves adequate to cover their liability in each case. Serious injuries and particularly those likely to involve permanent disabilities require more detailed reports and should be furnished as requested by the insur-

*See sample report on page 356 hereof.

‡See sample report on page 357 hereof.

†See sample report on page 358 hereof.

ance carrier. Their preparation will involve the necessity of measuring and otherwise evaluating the disability at the time of examination and should include the doctor's prognosis as to what part of the existing disability, if any, may remain as permanent disability factors. These reports should be prepared in accordance with the booklet, "Evaluation of Industrial Disability," as referred to above. If this is done, they will fill the needs of the insurance carrier and in such cases as are presented to the Industrial Accident Commission for determination of any problem will also fill its needs. It is

DOCTOR'S FIRST REPORT OF WORK INJURY

IMMEDIATELY after first examination mail one copy DIRECTLY to the Division of Labor Statistics and Research, P. O. Box 965, San Francisco 7, and two copies to the INSURANCE CARRIER. Failure to file a report with the Division is a misdemeanor. (Labor Code, Sections 6407-6413.) Answer all questions fully.

A. INSURANCE CARRIER Atlas Insurance Carrier - 123 Seventh Street, San Francisco

1. EMPLOYER Jones Hardware Tel. No. AB 3-1234
2. Address (No., St. & City) 750 Tenth Street, San Francisco 8, California
3. Business (Manufacturing shoes, building construction, retailing men's clothes, etc.) Retail Store

4. EMPLOYEE (First name, middle initial, last name) John J. Doe Tel No. XB 2-3456
5. Address (No., St. & City) 234 Eleventh Street, San Francisco, Cal. Marital Status M.
6. Occupation Clerk Age 40 Sex M.
7. Date injured 13 October 1954 Hour 3 P. M Date last worked Same
8. Injured at (No., St. & City) 750 Tenth Street, San Francisco, County San Francisco
9. Date of your first examination 13 Oct. 1954 Hour 5 P. M Who engaged your services? Employer
10. Name other doctors who treated employee for this injury None

11. ACCIDENT OR EXPOSURE: Did employee notify employer of this injury? Yes Employee's statement of cause of injury or illness:

Fell from ladder distance four (4) feet to floor.
Twisting injury to right ankle

12. NATURE AND EXTENT OF INJURY OR DISEASE (Include all objective findings, subjective complaints, and diagnoses. If occupational disease state date of onset, occupational history, and exposures.)

Simple fracture lateral malleolus rt. ankle - undisplaced.

DIAGNOSIS
Same.

13. X-rays: By whom taken? (State if none) St. Martha's Hospital
Findings:
As above

14. Treatment: Short leg cast applied - no anesthesia

15. Kind of case (Office, home, or hospital) Office If hospitalized, date Estimated stay
Name and address of hospital
16. Further treatment (Estimated frequency and duration) Weekly
17. Estimated period of disability for: Regular work 3 months Modified work 6 weeks
18. Describe any permanent disability or disfigurement expected (State if none) None
19. If death ensued, give date
20. REMARKS (Note any pre-existing injuries or diseases, need for special examination or laboratory tests, other pertinent information)

Do Not Write In This Space

Name Friend Hunton (Type or print) Degree M.D. { PERSONAL SIGNATURE OF DOCTOR }

Date of report 14 Oct. 1954 Address (No., St. & City) 450 Sutter Street, San Francisco 8, California

Use reverse side if more space required

FORM 5021 C
Crenshaw P. & S., Los Angeles

suggested in preparing such reports the findings be compared with those submitted in the last previous detailed progress report and, if any wide variation from the findings previously reported is found, that the attending physician attempt to determine and report the reason for the same. Such comparison also enables the physician to determine whether present treatment methods are producing results, or whether other methods should be considered, also whether the condition has become stationary or permanent. (For fee for this report see Item No. 2001 of the Fee Schedule.)

DOCTOR'S WEEKLY COMPENSATION ORDER

INSTRUCTIONS: Compensation Payments Are Based On Your Estimates Given Below. Please Submit Each Week on Same Day As Injury Until Patient is Able to Work.

Injured Albert J. Doe Claim No. X13-470

Employer Webster Electric Date Injured 13 May 55

I last examined patient on 23 May 1955

He (~~was not~~) (should) return to work approx. 1 July 1955
(Cross out one not applying)

Further length of treatment weekly - til above date.

Progress of case and prognosis: Complete recovery.

Signed: Dr. Friend Hunton Date 23 May 1955

(This is left blank so that the name of the Doctor to whom the card is posted can be entered)

FORM 5010C

(PRINT NAME AND ADDRESS OF INSURANCE CARRIER)

Claims Department

Dear Doctor:

Your cooperation in promptly furnishing the information requested on the attached card will permit us to make whatever further compensation payments are due your patient.

IMPORTANT: Please complete and return TODAY.

Claims Dept.,
(PLACE NAME OF INSURANCE CARRIER HERE)

Consultation Examination Reports

When asked to examine a patient as consultant or expert, the physician's reports will be of greater value if the following subjects are covered in detail:

1. The date and place of examination.
2. The patient's history of injury and developments to the date of examination including work status since injury and at time of examination.

This Space for Company Name
Address
and Crest (Optional)

DOCTOR'S SUPPLEMENTAL REPORT

(This space for Carrier's name and address)

Claim No.

(Designed to mail in window envelope)

1. Employer Hardy Paint Co.
2. Injured John D. Doe
3. Nature of Injury? Severe - Crush injury pelvis
4. Present condition (compare with last report) Patient has developed thrombophlebitis in right leg - temp. elevated - urinary output diminished - remains acutely ill - medical consultation requested - seen by Dr. Joseph Doakes 10 October 1954. Report to follow.
5. Treatment: Type? Supportive Further Length? 6 weeks Times per week Daily
   If physical therapy is being given, indicate type and times per week.
   None. Persistent swelling in right leg with possible permanent limp and some restriction weight-bearing ability.
6. If in hospital—How much longer? 3 months Private Room? Ward? Yes Private Nurse? Yes
7. Date of last examination 13 October 1954
8. Duration of further disability 6 months
9. Date able to return to work Approximately 6 months
10. Date actually returned to work
11. Is full recovery expected? No - see #5 above

Instructions:

(1) Submit weekly during acute stage of a serious case; monthly thereafter.
(2) Complete in triplicate.

Date 13 October 1954 Signed Friend Hunton M. D.

Street 450 Sutter Street

City San Francisco 8

Form 5020-A
Crenshaw P. & S., Los Angeles

DOCTOR'S FINAL (OR MONTHLY) REPORT AND BILL

Itemized bills, IN DUPLICATE, are to be submitted at the termination of the case.
Monthly statements are POSITIVELY required on cases under treatment.
Mail to Atlas Insurance Company Address 123 Seventh Street, San Francisco
Services beginning late in month and extending into succeeding month may be itemized on one statement.

EMPLOYER Able Laundry Service
EMPLOYEE James Doe
DATE OF INJURY 1 Nov. 1954 SERVICES FOR MONTH OF December, 1954

Patient refused treatment ..., 19...
Patient stopped treatment without orders ..., 19...
Patient entered hospital 1 Dec, 1954

Patient able to return to work 28 Dec., 1954
Patient discharged as cured 28 Dec., 1954
Condition at time of last visit Recovered

Any other charges authorized such as Drugs? X (Check) Hospital? X (Check)

Code: O—Office; V—Home Visit; H—Hospital Visit; N—Night Visit; S—Operation; X—X-Ray.

Month	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
	S	H	H			O			O			O						O										O			

	Totals
First aid treatment (describe) Debridement wound - 2 inches palm of right hand - suture (1806)	$ 6.00
Office Visits Five (0008)	$ 14.25
Home Visits	$
Hospital Visits Two (0009)	$ 6.00
Operations See above	$
MATERIAL (Itemized at cost)	$
TOTAL	$ 26.25

Any charges shown above which are in excess of the minimum fee must be explained below regarding nature of such services, indicating the date rendered.

Make check payable to:

Doctor Friend Hunton, M. D. Signature

Address 450 Sutter Street, San Francisco 8 Date 28 December 1954

Form 5030-B
Crenshaw P & S., Los Angeles

3. The patient's past history with particular reference to the past injuries or illnesses which will affect the doctor's opinion of the patient's present condition.
4. The examination findings including x-ray and/or laboratory findings.
5. The diagnosis and opinion, and apportionment of disability, if any, expressed in percentage between the injury or disease and any other existing disease.

Most frequently consultation is needed to solve some problem. For example, the exact nature of treatment indicated, whether the patient's present complaints are related to the injury claimed, whether the claimant is, or is not, temporarily disabled from work, etc. In each case, to be of value, the physician must express a definite opinion one way or the other. A "yes" and "no" answer solves nothing, hence to the best of his ability the physician should express his impartial and unbiased opinion in the matter *and state the reason for having arrived at that opinion.* The physician must personally sign the report.

Doctor's Final (or Monthly) Report and Bill‡

Standard Form No. 5020B should be submitted in duplicate promptly after the patient is discharged from treatment or it is evident that he will not return for treatment. If he has not returned but there is danger of complications from lack of treatment, it is suggested the insurance carrier be notified immediately so the patient can be contacted and an attempt made to have him return for treatment. Particular attention is called to the questions showing the result or disposition of the case. The appropriate question or questions must be answered. Too many physicians leave them blank, hence the carrier does not know whether the patient has been discharged as cured, has failed to return for treatment, whether or not any permanent disability has resulted, or just what has happened. If the patient discontinued treatment without orders, it would be helpful if the doctor would describe patient's condition at the time of last visit; this for both the record of the insurance carrier and the physician.

MEDICAL FEES

Medical fees for treatment of industrial injuries in California are now subject to a schedule approved by the Industrial Accident Commission with which the physicians should become quite familiar. It is a schedule of minimum fees, not based on the ability of the employer or insurance carrier to pay, but determined to be fair compensation to the attending physician for services rendered in these cases. Charges in excess of the fees set by the schedule may be in order. However, when such exceptional charges are rendered, it should be clearly explained on the bill or by letter why the doctor feels an excess charge is warranted. Failure to so explain will result in the fee being reduced, inquiry from the insurance carrier, or delay in payment and possible misunderstanding. An excess charge would not seem justified because one physician may take longer than others to perform a specified procedure. It should be based on exceptional physical difficulties encountered at the time the procedure was undertaken. Inasmuch as every physician is expected to treat the injury involved in the most expert manner, fees cannot be determined by the adequacy of results obtained. The bill should be carefully itemized on the basis of the fee schedule so there will be no difficulty in auditing the same when it reaches the carrier. Drugs and dressings furnished by the physician should be itemized and charged for at cost. Some of the problems which may cause misunderstanding or at least concern the carrier in connection with the billing of cases include:

1. Bill not promptly rendered.
2. Bill not completed to show disposition of the case.
3. Fees not in conformity with the fee schedule and unexplained by the physician.
4. Appearance of excessive or unwarranted treatment.
5. Finding that the average cost of care by certain physicians may greatly exceed the average cost of others handling a volume of compensation cases and treating a comparable class of injuries. In this respect insurance carrier examiners are not physicians. It is impossible for them to specify why one doctor's average costs consistently run much higher than others. This question does not necessarily involve the integrity of the physician or his office staff. Some matters which may result in this situation include the following:
   (a) Excessive frequency or prolongation of treatment due to lack of control in the physician's office. (Remember many patients lose wages while reporting for treatment.)
   (b) Possible lack of thought in the ordering of x-rays, drugs, etc., or the quantity thereof.

‡See sample report on page 359 hereof.

PERMANENT DISABILITY RATINGS AND REPORTS

Any employee sustaining permanent disability is entitled to compensation therefor. The attending physician should report to the insurance carrier when he believes the condition has reached a permanent and stationary stage. One error lies in reporting the case for permanent disability rating too early as shown by many cases where subsequent improvement has taken place and in others where the condition has become worse. Where subjective complaints or loss of grasping power are involved, the case ordinarily should not be rated under one year from the date of injury or until the patient has in any event worked for some months. Consideration should be given to apportionment of disabilities due to the injury in relation to the entire disability. The Industrial Accident Commission prescribes and furnishes forms for the reporting for permanent disability rating purposes. These forms will be useless unless they are properly completed in detail. Again, reference is made for this purpose to the booklet "Evaluation of Industrial Disability." See Item No. 2002 of the Fee Schedule for applicable fee for such report.

LEGAL PROCEEDINGS

The physician's part in the successful administration of the State Workmen's Compensation Act is a very important and exacting one. His obligation does not end with the administration of medical and surgical services to his patient. On the contrary, he owes a further obligation to his patient and to the people of the state of California, for he is a vital part of the entire system of workmen's compensation.

In 1913, the people of the state of California adopted a relatively uniform workmen's compensation act which was designed to eliminate the strife and uncertainty which existed between Labor and Management prior to the passing of the statute, and to provide in its place an orderly system for the disposition of industrial injuries and diseases. It provided for the employee a certain and definite source of income and a provision for medical, surgical, hospital, and drug expense during a period of disability or physical infirmity resulting out of and in the course of the employment. The cost for the administration of this entire program is borne by the employer who, in most cases, secures the payment for these items through the medium of an insurance policy, although some of the larger employers "self-insure." The machinery for the handling of industrial accidents is vested in the Industrial Accident Commission.

The Commission, appointed by the Governor, is composed of two panels of three members each who are assigned to the panels by the chairman of the Commission. Panel One is located in San Francisco, and Panel Two in Los Angeles. Cases are heard by hearing officers or "referees" who sit in various parts of the state to cover a calendar of cases assigned for trial before these referees. The number of referees varies with the volume of business coming before them.

Although the Commission is an administrative body designed to streamline the processing of industrial injury, it is nevertheless a court of law. It has the power of subpoena and otherwise possesses, generally, powers that exist in the Superior Courts, except that its jurisdiction is specifically limited by statute to industrial injuries and diseases and collateral matters having to do with industrial injuries and diseases. On the other hand, the formality which one sees in the handling of cases before the Superior Court does not exist in Industrial Accident Commission hearings. These hearings are informal in nature designed to accomplish the objective of disposing of the case on a just, equitable, and speedy basis.

The only legal proceeding with which the physician will be involved will be a hearing before the Industrial Accident Commission. Where the circumstances require, the physician is expected to appear before the Commission, although this is relatively rare, as written reports of the physicians are admissible in evidence and thus personal appearance is seldom required. However, where required, the doctor should cooperate and appear willingly. He is entitled to a fee for his services. If the physician will contact the company representative or attorney, he can arrange to be on call rather than to spend needless time in the hearing room. If for any reason the plans for the physician's appearance are changed, he will normally be notified but in view of possible oversight, it is suggested he check with the person issuing the subpoena a day or two before the hearing to avoid the possibility of an unnecessary appearance.

REHABILITATION

In cases of serious injury where permanent disability may result to bodily parts, the attending physician should make recommendations to the employer or insurer with regard to the advisability of referring the employee to a facility of rehabilitation in order that the permanent disability will be reduced to a minimum and the worker reconditioned to the ability to work.

In cases where the anticipated permanent disability is so severe that the rehabilitation to employa-

bility through physical rehabilitation is not possible, the attending physician should consult the State Department of Vocational Rehabilitation and the employer or insurer to see if a plan for retraining in other types of employment may be advisable. These cases should be evaluated as early as possible. If retraining in other types of employment is necessary and feasible, it will be psychologically and financially to the advantage of the employee that such training be started while payment of temporary disability compensation benefits is continuing.

OFFICE RECORDS

It is important that the attending physician maintain adequate records of compensation cases. The form of record may vary. In addition to having an individual case folder in which may be filed copies of reports, etc., it is a common practice to maintain a case history card on which the brief history of the case is noted. Such cards are usually prepared so that the date of each visit and the nature of the treatment rendered may be noted, from which record adequate billing can be made.

CONCLUSION

As stated, the purpose of this outline is to better acquaint physicians with the problem of those concerned with workmen's compensation cases, the employee, the employer, the insurance carrier, and the Industrial Accident Commission. It can be fairly stated that the insurance carriers desire to meet their just obligations. In the interest of maintaining the best possible relations between the attending physician, the patient, employers or their insurance carriers, it is important that there be full communication to interested parties of all important factors affecting the progress of the medical care of the patient. Occasionally the attending physician may observe a tendency to malinger or a patient's refusal to cooperate with the physician in his efforts to bring about speedy and complete recovery from the effects of the injury. The physician should, in the best interests of the proper administration of the Workmen's Compensation Law, communicate the facts frankly and fully to the employer or its insurance carrier.

Reprints of this article may be obtained by any M.D. practicing in the State of California upon request to California Medical Association, 450 Sutter Street, San Francisco 8.

Survey of Medical Resources to Meet Enemy Attack

SHOULD RUSSIA or one of her ill-advised satellites to whom logic is alien, launch an all-out attack against this country, how would California's medical resources begin to meet the enormous casualty problems that would inevitably result?

The answer to this question, or at least some of the basic tools with which a partial answer may be forthcoming, are expected to be derived from a statewide survey of disaster care capacity facilities which was begun last month. In announcing the survey, Frank L. Cole, M.D., Chief of the Division of Medical and Health Services for the State Office of Civil Defense, predicted that the entire medical profession would be vitally interested in the study inasmuch as it will provide for the first time a comprehensive statewide inventory of California's medical resources.

In addition to the normal facilities in day-to-day use, the study will determine blood bank capacities, numbers of available medical personnel and those in related professions, and space which can be used for improvised medical facilities.

The medical resources survey will be part of an overall care capacity inventory in which every community and rural area in California—outside of critical target areas—will be scrutinized for all possible facilities which could be used to feed, shelter, clothe and provide medical care for dispersed populations of major cities should they be subjected to attack.

Four divisions of the Office of Civil Defense will cooperate on the survey. They include, besides the medical and health unit, the Evacuation and Welfare Services, Utilities, and Engineering. The Division of Evacuation and Welfare will determine the total capacities of the state to care for able-bodied, or uninjured dispersees, while the Utilities and Engineering Divisions will coordinate with the survey to determine whether sewer, water, electricity and gas capacities might be limiting factors in providing such care.

Physicians and local health officers will be asked to cooperate in procuring much of the information required for the study operation, which is believed to be the first and largest of its kind in the nation. Together with hospital administrators in local communities, they will be asked to assist local CD directors in surveying existing hospitals both for their existing and emergency expanded capacities. In addition, listings will be established of structures

and space which could meet qualifications for serving either as congregate shelters for mass care or as improvised or auxiliary hospital purposes.

The survey is strictly an inventory of resources and capacities, according to Dr. Cole. "No attempt is being made during the survey period to relate the facts and figures to actual use or to the development of a detailed program for the care of people following a disaster," he explained. "The necessary action to prepare specifically for the care of people will be considered after the survey has been completed."

Preliminary groundwork for the statewide operation was laid by conducting two separate "pilot" studies last year—one in the city of Ventura and the other in San Mateo County. In these areas, full scale surveys were conducted primarily to determine criteria, or "yardsticks," and to develop simplified methods, procedures and forms for use in the larger study. Many factors of interest to the medical profession were developed in these preliminary surveys, notable among which was the compilation of data related to the emergency expansion potential of existing hospital spaces.

Dr. Cole urged that all Civil Defense medical chiefs as well as county health authorities and interested physicians discuss the survey thoroughly with their local Civil Defense directors. "The study will permit the medical profession in the State of California to assume an outstanding position in the nation by being fully able to coordinate and direct the medical care activities in any part of the state should an emergency arise," he pointed out.

Poliomyelitis Vaccination Project

SINCE IT APPEARS that the information it contains will be of interest to many physicians in addition to the local health officers for whom it was prepared, we publish here a statement by Dr. Malcolm H. Merrill, director of the California State Department of Public Health, regarding the proposal for poliomyelitis vaccination of first and second grade school children.
—Editor.

THE National Foundation for Infantile Paralysis (NFIP) has contracted to purchase from pharmaceutical manufacturers enough material to provide 9,000,000 complete vaccinations so that if the evaluation of the 1954 field trial of the Salk poliomyelitis vaccine indicates that the vaccine is effective, and the product is licensed for commercial use by the National Institutes of Health, at least this limited supply of vaccine may be available before the 1955 poliomyelitis "season." This commitment will also allow commercial laboratories to be prepared to produce additional quantities of vaccine.

While the final details of the NFIP proposal have not been issued, the following is a resume of currently available information:

The NFIP has contracted to purchase sufficient material to provide 9,000,000 vaccinations of three injections each. This vaccine will be distributed on request to states and territories. The mechanics of distribution are left to each State Health Officer.

Material and Use. The Salk vaccine is a polyvalent killed virus vaccine. A vaccination will consist of three injections, with an interval of one week between the first two injections and one month between the second and third injection. The dose for each injection is 1 cc. The material is injected intramuscularly.

As with all licensed biologics now, the brochure enclosed in the package will recommend that a separate syringe and needle be used for each injection.

Packaging and Preservation. The vaccine is to be packaged in 10 cc. vials, each vial containing 9.5 cc. or sufficient material for nine injections. It is not certain at this time whether the vaccine will contain a preservative. If no preservative is used, the material would have to be used within a few hours after a vial is opened.

Eligible Persons. Two groups will be offered the material under the NFIP's proposal.

1. All children who participated in the 1954 trials but who did not receive the vaccine (the controls). In California approximately 3,500 children in Alameda County will be in this group.

2. All children enrolled in the first and second grades of all primary schools—public, private, and parochial—in the continental United States, Alaska, and Hawaii in the spring term of 1955. In California, the current estimate for this group is 510,000 children.

Date of Availability. After the report is rendered on the evaluation of the Salk vaccine field trial, the National Institutes of Health will consider the granting of licenses to produce for commercial sale. It has been estimated that the NIH considerations may be completed in a week or so. The material may be packaged in advance and ready for shipment so that receipt in the state [California] could be within 24 hours after the granting of a license. It is possible that the state's allotment may not arrive in one shipment, thus raising the possibility of a staggered distribution schedule in the state.

Role of NFIP in Local Administration and Provision of Supplies. The NFIP will ask its local chapters to designate an individual to be responsible for organizing assistance when requested by the local health officer. The NFIP will not provide syringes or needles. Informational and organizational materials are being developed for use if desired by the

individual states. In California, such materials would be requested from the NFIP by the State Department of Public Health if desired by the individual local health jurisdictions.

STATE AND LOCAL PARTICIPATION

The following statements are based upon the recommendations of the State Advisory Committee at its meeting of January 21, 1955:

State Endorsement of NFIP Proposal. The State Department of Public Health endorses this project of active immunization with poliomyelitis vaccine for all children enrolled in the first and second grades of all primary schools—public, private, and parochial—in California and strongly encourages statewide participation. This endorsement is contingent upon a favorable report that the vaccine is a safe and effective prophylactic agent against poliomyelitis and the granting by NIH of license to produce the material for commercial sale.

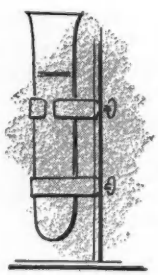
Local Participation. Local health officers* of areas desiring to participate in this project should notify the State Department of Public Health of their interest. In the near future, it is anticipated that each health officer will be requested to furnish the State Health Department with a count of all children enrolled in the first and second grades of all primary schools—public, private, and parochial—in his area as of a stated date during the spring term of 1955.

Organization and Administration. Local health departments have had long experience in promoting and achieving immunization of large segments of their populations. Therefore, it seems most feasible for each local department to use its own methods and procedures to bring about this additional immunization of first and second grade school children with poliomyelitis vaccine in the spring of 1955. It is recognized that a wide variety of methods will be employed in the 67 health jurisdictions of the state.

Areas in which health departments have not been organized may wish assistance in the planning of procedures for this special immunization project. The State Health Department will arrange for such assistance upon request.

If this project is undertaken, every effort should be made to immunize all eligible persons well ahead of the period of maximal frequency of poliomyelitis in 1955. In this connection, if a delay in receipt of vaccine occurs, and if there is a need for scheduling shipments of vaccine to local areas, first priority will be given to Alameda County for children who participated in the 1954 field trials but who did not receive vaccine at that time. Scheduling of the remainder will be planned in south to north order.

*Health officer of all full-time departments, County Health officers of other areas.



THE PHYSICIAN'S *Bookshelf*

OF PUBLISHING SCIENTIFIC PAPERS. George E. Burch, M.D., F.A.C.P., Henderson Professor of Medicine, Tulane University School of Medicine. Grune & Stratton, New York, 1954. 40 pages, $2.75.

This illustrated booklet of 40 pages which was Dr. Burch's presidential address before the Central Society of Clinical Research in 1953, is an excellent summary of many of the problems arising in presentation and writing of scientific facts. Investigators and authors are classified as "the self-plagiarist, the self-aggrandizer, the obsessive writer, and the ones with tubular vision." Types of readers are "the critic," "the scanner," and "the summary addict." Editors are criticized as often being too critical and dictatorial, and editorial boards as composed of those who are board-o-philiacs or "men of distinction" rather than active, vigorous investigators. There is general criticism of the sensationalism regarding scientific material in the lay press and a note about the "miracle monger."

Burch's criticisms are well taken and lead one to conclude with him that improvement in scientific writing can come "only from demanding the highest integrity and performance among all concerned with writing scientific papers."

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ACUTE POLIOMYELITIS—Diagnosis and Treatment of the Acute Phase of Poliomyelitis and Its Complications. Edited by Albert G. Bower, M.D. The Williams and Wilkins Company, 1954. 257 pages, $6.50.

This volume commands respectful reading because its conclusions are based on the team care of 18,000 acute cases of poliomyelitis. The authors' concern is for the most part with the acute phase of the disease, the essentials of diagnosis and early treatment, the recognition of the various complications which appear during the early stage, and especially the management of emergency situations which may then arise.

Respiratory paralysis occurring in both the bulbar and spinal forms of the disease is dealt with in detail with respect not only to the clinical considerations which point to respiratory inadequacy but also with regard to the various instrumental measures and laboratory studies which may be utilized to determine ventilatory capacity and gas exchange.

Few would question the value of tracheotomy in a considerable proportion of those with respiratory failure and impaired airway but these authors recommend this operation with an enthusiasm which is somewhat greater than that which currently obtains throughout the country. There are excellent discussions of the indications for this operation, of the technique of operation and of special methods which are necessary for successful after-care in the tracheotomized patient.

Methods for temporary or long continued artificial respiration are described with comment on the many mechanical appliances which are available for this purpose.

A final chapter is devoted to applying to the use in a small hospital of the methods of diagnosis and treatment previously described. This section does not succeed in the simplification of this matter so as completely to guide the hospital in which only an occasional patient with this disease may be admitted.

It is extremely doubtful that all the many problems in the care of poliomyelitis can be routinized within the resources of other than well equipped institutions with adequately trained personnel. Nonetheless this book contains many valuable suggestions and much good advice which can be profitably read by any physician responsible for the care of patients with poliomyelitis, whether the patients be many or few.

* * *

MANUAL OF CLINICAL MYCOLOGY—Second Edition. Norman F. Conant, Ph.D., Professor of Mycology and Associate Professor of Bacteriology; David Tillerson Smith, M.D., Professor of Bacteriology and Associate Professor of Medicine; Roger Denio Baker, M.D., Chief, Laboratory Service, Professor of Pathology; Jasper Lamar Callaway, M.D., Professor of Dermatology and Syphilology, all from Duke University School of Medicine; and Donald Stover Martin, M.D., Chief, Bacteriology Section, Communicable Disease Center, Chamblee, Georgia. W. B. Saunders Company, Philadelphia, 1954. 456 pages, 202 figures, $6.50.

During the decade just past, the need for additional information concerning fungus infections has become apparent to physicians in all fields of medicine. Seemingly, there has been an increase in the incidence of mycotic infection. With more laboratories having facilities for the isolation of pathogenic fungi, naturally more cases are being found. It is known also that antibiotic therapy can be responsible for a change in the fungus flora of the body.

The second edition of the "Manual of Clinical Mycology" by Conant et al. is the latest and the most complete book now available on the subject of mycotic infections. This edition brings together recent advances concerning epidemiological, immunological and therapeutic information as well as presenting concise, well-written descriptions of the symptomatology, pathology and mycology of fungus infections.

The deep or systemic mycoses constitute the major portion of this book. Each disease is taken up separately, discussed thoroughly, and illustrated with photographs of lesions and roentgenograms. The mycology section of each chapter discusses the appearance of the fungus in the clinical specimen and specific methods of isolation. Each organism is illustrated by photomicrographs. This portion of each chapter will be exceedingly useful as a reference for those laboratories which may be called upon to isolate and identify a pathogenic fungus. The chapters on the fundamentals of mycology and on the common contaminants will also prove helpful.

The chapters delegated to the fungus infections of the superficial layers of the skin are comparatively brief. No doubt many physicians would desire more detailed informa-

tion, especially in the section on differential diagnosis. Many fine photographs of lesions are included and there is an illustrated chapter on the mycology of the dermatophytes. The authors have made use of recent physiological studies on the dermatophytes which simplify classification considerably. A chapter on the immunology of the dermatomycoses will be of interest, especially for those physicians who see patients who have developed a hypersensitivity to their mycotic infection. An understanding of such "id" reactions is of great importance in the therapeutic regimen.

The bibliography, although not comprehensive, contains recent publications, especially those with full reference lists.

The appendix includes sections on mycologic culture methods, tissue staining techniques, immunologic methods and a formulary.

This book will satisfy the needs of physicians in all branches of medicine who desire the latest information concerning fungus infections. Its succinct presentation makes it a highly useful book, preferable to all others now available on the subject of fungus infection.

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ANNUAL REVIEW OF MEDICINE—Volume V. Windsor C. Cutting, Editor, Stanford University School of Medicine; and Henry W. Newman, Associate Editor, Stanford University School of Medicine. Annual Reviews, Inc., Stanford, Calif. 490 pages, $7.00.

The Annual Review of Medicine, Vol. V, for 1954, continues their invaluable series of medical reviews. In general, one may criticize the mechanics of publication that necessitate the appearance in December 1954 of reviews, which finish with the literature of the fall of 1953, so that when a reviewer states that his chapter covers the literature from the beginning of 1952 to the present, he really means from the beginning of 1952 to September 1953.

Each section has an extensive bibliography, the largest perhaps being that devoted to endocrinology, which has 433 references; the most limited is that on anesthesia, with 57 references. One might also criticize the titles given to some chapters. The one headed *Radioactivity*, a field of great importance, especially if radioactive isotopes were considered, is limited to the effects of irradiation injury. The chapter, *Laboratory Aids to Diagnosis and Therapy*, an enormous, extremely important clinical subject, is actually confined to the phenomena of hemagglutination. And the chapter on hematology, *Diseases or the Reticuloendothelial System and Hematology*, is limited to an excellent review of hemorrhagic disorders.

With these limitations, the listing of the literature and the discussions of published work during the years 1952 and 1953 are very valuable. The section on infectious diseases, by Jawetz, and that on endocrinology by Soffer and Gabrilove are especially to be recommended.

The volume, as usual, concludes with the widely annotated list of reviews by MacKay, which certainly furnishes useful and immediate orientation in many fields.

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TEXTBOOK OF PEDIATRICS—Sixth Edition. Edited by Waldo E. Nelson, M.D., Professor of Pediatrics, Temple University School of Medicine. With the collaboration of seventy contributors. W. B. Saunders, Philadelphia, 1954. 1,581 pages, $15.00.

The sixth edition of this standard pediatric text, formerly known to pediatricians as Mitchell-Nelson, is now under Nelson's name alone. This is a reasonable change, since Mitchell has now been dead 15 years, and little of the material prepared by him remains. A four-year interval has elapsed since the fifth edition, during which the many discoveries and developments in the field of childhood medicine have occurred. It is therefore interesting to note that the present edition contains about 100 fewer pages than the last previous one, largely the result of deliberate and innocuous condensation. Like most modern standard medical texts, this is the work of a large number of collaborating specialists, some of them outside the area of pediatrics in its stricter sense. In the present edition these number 72, including the editor. In general, they have been carefully selected and are of a high grade of competence.

It is obviously impossible to offer a detailed critique of many separate articles. During the period since the volume has come to the reviewer's desk, he has made frequent references to specific topics and has as yet failed to find more than a very few not discussed. However, a few instances of incomplete coverage might be mentioned. Under diarrheal disorders, the important recent discovery of E. coli 0111 as a cause of epidemic diarrhea and its susceptibility to certain antibiotics are not mentioned. The convulsant effect of pyridoxine B_6 deficiency, which recently caused alarm in relation to a particularly proprietary milk-substitute is dealt with too cursorily. Under laboratory procedures in the diagnosis of rheumatic fever, antistreptolysin O and antihyaluronidase are not mentioned. The diagram of the major findings in poliomyelitis is incorrect in several respects. Furadantin is not mentioned in the section on antibiotics.

The majority of sections have been revised or completely rewritten. There are new sections on: selection of antimicrobial agents; isolation measures for infectious diseases; Coxsackie virus infections; cat-scratch fever; cytomegalic inclusion disease; toxocariasis and visceral larva migrans; pneumatosis intestinalis; cysts of the liver; pancreatic dysplasias simulating pancreatic fibrosis; metabolic disorders simulating rickets; the eyes of the newborn infant; sarcoidosis; and radiation injury. Chapters that have been completely rewritten include: the ear; diseases of the blood (with new classifications); the eye (with an excellent discussion of retrolental fibroplasia and fine colored photographs of the various stages); and neoplasms and other tumors.

The index is superb; I estimate that it now contains over 10,000 items, as compared with about half that number in the preceding edition.

This volume is a "must" for the up-to-date pediatrician's library.

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CLINICAL CHEMISTRY IN PRACTICAL MEDICINE—Fourth Edition. C. P. Stewart, D.Sc. (Dunelm), Ph.D. (Edin.), Reader in Clinical Chemistry; and D. M. Dunlop, B.A. (Oxon.), M.D., F.R.C.P. (Edin.), F.R.C.P. (Lond.), Christison Professor of Therapeutics and Clinical Medicine, both from the University of Edinburgh. E. & S. Livingstone Ltd., London, distributed by Williams and Wilkins Co., Baltimore, Md., 1954. 320 pages, $5.00.

This is a practical volume which presents the everyday application of biochemistry in clinical medicine. It is not an elaborate text and does not attempt a comprehensive account of all laboratory tests but it does select those which the authors consider important, useful and reliable. These are detailed in a separate appendix.

The book has been revised rather thoroughly since the third edition was reviewed in 1949. The chapters and the subject-matter are rearranged in more desirable sequence. The authors have the knack of writing with clarity and conciseness. (The chapter on collection and preservation of samples may be cited as an example of clear medical writing.)

Although this is a Scotch text, written primarily for local consumption, it can be recommended for consumption by practitioners and students generally.